



2009

# Effects of Messages About Genetics, Race, and Health on Public Opinion About Personalized Medicine and Health Policy

Jocelyn Landau

University of Pennsylvania, [jocelynlandau@gmail.com](mailto:jocelynlandau@gmail.com)

Follow this and additional works at: <http://repository.upenn.edu/edissertations>



Part of the [Health Communication Commons](#), and the [Social Influence and Political Communication Commons](#)

---

## Recommended Citation

Landau, Jocelyn, "Effects of Messages About Genetics, Race, and Health on Public Opinion About Personalized Medicine and Health Policy" (2009). *Publicly Accessible Penn Dissertations*. 60.  
<http://repository.upenn.edu/edissertations/60>

This paper is posted at ScholarlyCommons. <http://repository.upenn.edu/edissertations/60>  
For more information, please contact [libraryrepository@pobox.upenn.edu](mailto:libraryrepository@pobox.upenn.edu).

---

# Effects of Messages About Genetics, Race, and Health on Public Opinion About Personalized Medicine and Health Policy

## **Abstract**

Since the completion of the Human Genome Project, knowledge about the genetic basis of many traits and common diseases has increased substantially (Kessler et al., 2007). As progress in the field of genetics continues to occur at a rapid pace, there is growing concern about the social and ethical consequences of these advances. One area of concern that merits more empirical research is the impact of messages linking genetic traits with racial differences. Research in this area is important because recent studies have shown that casting race as a biological marker can provide justification for a racially inequitable status quo and for the continued social marginalization of historically disadvantaged groups (Williams & Eberhardt, 2008). At the same time, most of the U.S. public is at the early stages of forming beliefs and attitudes about genomics, and the media are largely influential in citizens' awareness and understanding of genetics (Smith, 2007).

This dissertation examines the effects of messages about genetics, race, and health on public opinion about personalized medicine and health policy. A series of three experiments embedded in online surveys were used to assess the impact of racial cues and controllability attributions on audience's opinions about current health topics and policies related to personalized medicine and genetics. Results provide evidence that racial cues and controllability attributions in health messages are consequential in shaping public opinion about genetics and medicine, as well as related policy preferences. Messages about medical advances related to genetics may raise issues of trust and acceptance among minority groups, while in-group racial cues may mitigate these concerns. Framing health risks as either controllable (behavioral) or uncontrollable (genetic) influences peoples' opinions, causal attributions for disease, and health policy preferences. These effects were also conditioned by relevant background variables, including education, political ideology, and racial attitudes. The findings support the idea that information about genetics, race, and health function within an intricate structure of attitudes and beliefs (Condit & Bates, 2005). Implications of these findings are discussed and directions for future research are proposed.

## **Degree Type**

Dissertation

## **Degree Name**

Doctor of Philosophy (PhD)

## **Graduate Group**

Communication

## **First Advisor**

Dr. Joseph Cappella

## **Second Advisor**

Dr. Michael Delli Carpini

---

**Third Advisor**

Dr. Vincent Price

**Keywords**

Public Opinion, Genetics, Health Policy, News Media, Message Effects, Personalized Medicine

**Subject Categories**

Health Communication | Social Influence and Political Communication

EFFECTS OF MESSAGES ABOUT GENETICS, RACE, AND  
HEALTH ON PUBLIC OPINION ABOUT PERSONALIZED  
MEDICINE AND HEALTH POLICY

Jocelyn Landau

A DISSERTATION  
in  
Communication

Presented to the Faculties of the University of Pennsylvania in Partial  
Fulfillment of the  
Requirements for the Degree of Doctor of Philosophy

2009

---

Supervisor of Dissertation

---

Graduate Group Chairperson

Dissertation Committee:

Dr. Michael Delli Carpini

Dr. Vincent Price

Dr. Joseph Cappella

EFFECTS OF MESSAGES ABOUT GENETICS, RACE, AND HEALTH ON PUBLIC  
OPINION ABOUT PERSONALIZED MEDICINE AND HEALTH POLICY

COPYRIGHT

Jocelyn Landau

2009

## ACKNOWLEDGEMENTS

On more than one occasion, I compared the process of writing this dissertation to a rollercoaster ride. The experience included several ups and downs, unexpected turns, and a mixture of feelings that varied from excitement to trepidation. Many people rode alongside me on this journey, and I am happy for the opportunity to acknowledge them. I am indebted to my academic advisor and Committee Chair, Dr. Joseph Cappella, for his guidance and thoughtful feedback on my work. Dr. Cappella's insightful comments and questions challenged me to become a better researcher and scholar. I learned more in the past twelve months than I ever imagined possible. I also greatly benefited from working with my committee members, Dr. Michael Delli Carpini and Dr. Vincent Price. Dean Delli Carpini offered support and encouragement throughout graduate school, and has shown by example that learning is as much about listening as it is about asking questions. Dr. Price illustrated for me the art of survey questionnaire design, and his seminar on public opinion research largely influenced my subsequent work as a graduate student. Each of my committee members offered unique perspectives on my research, and I have benefited tremendously from working with such an accomplished group of individuals.

This research was supported by the National Human Genome Research Institute (NHGRI) of the National Institutes of Health (NIH) by grant #R01HG004318 (Dr. Joseph Cappella, PI).

I am also grateful to the Annenberg School for Communication, especially to Walter and Leonore Annenberg for generously endowing the Annenberg School for Communication and establishing a remarkable place of learning. My earliest experiences

at Annenberg were as an undergraduate majoring in communication at the University of Pennsylvania. My first undergraduate communication class was Dr. Kathleen Hall Jamieson's Introduction to Political Communication. I was immediately hooked on the subject matter, and signed up to major in communications shortly thereafter. I am thankful to have worked with and learned from Dr. Jamieson, and I am glad that her undergraduate course set me on this academic trajectory. Professor David Eisenhower also greatly influenced my decision to return to Annenberg as a graduate student. Throughout college and since, Professor Eisenhower has been a wonderful mentor and friend. I am also thankful to Professor Monroe Price for giving me the opportunity to work and study abroad at Central European University in Budapest, and for challenging me to think globally about my research. In addition, I would like to thank Beverly Henry and Joanne Murray for their tireless efforts on behalf of graduate students at Annenberg.

My colleagues at the Annenberg School have been the source of countless interesting discussions, academic support, and lighthearted fun. I would especially like to thank Rebekah Nagler, Brittany Griebeling, Mike Serazio, Sarah Vaala, Shawnika Hull, Ken Winneg, Lee Shaker, Lauren Feldman, Emily Thorson, Matt Lapierre, Cabral Bigman, Young Min Baek and Ashley Sanders-Jackson for their friendship and encouragement. I also walked through each phase of graduate school with support from members of my cohort at Annenberg, including Jessica Taylor-Piotrowski, Susana Ramirez, Derek Freres, Lokman Tsui, Robin Stevens, Magdalena Wojcieszak and Susan Haas.

Most of all, I am forever grateful to my family for their steadfast encouragement through all of my endeavors. My parents are my greatest fans and supporters, and I owe every accomplishment to them. I am so lucky to have my sister Shana, the best advice-giver and confidant; she is both a mentor and role-model for me. My fiancé, Scott Palmer, has been with me through every step of graduate school and this dissertation, and his support and love have been invaluable to me. As I conclude this dissertation and my graduate degree, I am closing an important chapter in my life and looking forward to what the future holds.



## **ABSTRACT**

### **EFFECTS OF MESSAGES ABOUT GENETICS, RACE, AND HEALTH ON PUBLIC OPINION ABOUT PERSONALIZED MEDICINE AND HEALTH POLICY**

Author: Jocelyn Landau

Supervisor: Joseph Cappella

Since the completion of the Human Genome Project, knowledge about the genetic basis of many traits and common diseases has increased substantially (Kessler et al., 2007). As progress in the field of genetics continues to occur at a rapid pace, there is growing concern about the social and ethical consequences of these advances. One area of concern that merits more empirical research is the impact of messages linking genetic traits with racial differences. Research in this area is important because recent studies have shown that casting race as a biological marker can provide justification for a racially inequitable status quo and for the continued social marginalization of historically disadvantaged groups (Williams & Eberhardt, 2008). At the same time, most of the U.S. public is at the early stages of forming beliefs and attitudes about genomics, and the media are largely influential in citizens' awareness and understanding of genetics (Smith, 2007).

This dissertation examines the effects of messages about genetics, race, and health on public opinion about personalized medicine and health policy. A series of three experiments embedded in online surveys were used to assess the impact of racial cues and controllability attributions on audience's opinions about current health topics and policies related to personalized medicine and genetics. Results provide evidence that

racial cues and controllability attributions in health messages are consequential in shaping public opinion about genetics and medicine, as well as related policy preferences. Messages about medical advances related to genetics may raise issues of trust and acceptance among minority groups, while in-group racial cues may mitigate these concerns. Framing health risks as either controllable (behavioral) or uncontrollable (genetic) influences peoples' opinions, causal attributions for disease, and health policy preferences. These effects were also conditioned by relevant background variables, including education, political ideology, and racial attitudes. The findings support the idea that information about genetics, race, and health function within an intricate structure of attitudes and beliefs (Condit & Bates, 2005). Implications of these findings are discussed and directions for future research are proposed.

## TABLE OF CONTENTS

LIST OF TABLES.....	xi
LIST OF FIGURES.....	xiii
CHAPTER ONE: INTRODUCTION.....	1
Overview .....	3
CHAPTER TWO: GENETICS, RACE AND MEDICINE.....	5
Messages about Genetics and Race .....	5
Public Opinion about Genetics and Race.....	7
Personalized Medicine and Race-Based Medicine .....	9
Genetic Discrimination and Genetic Determinism .....	11
CHAPTER THREE: MESSAGE EFFECTS .....	16
Message Framing .....	16
Framing and Priming Theory .....	19
Racial Priming, Stereotypes and Prejudice .....	21
CHAPTER FOUR: ATTRIBUTIONS IN MEDIA MESSAGES .....	26
Attribution Theory .....	26
Media and Causal Attributions about Social Issues.....	28
Intergroup Attribution and Ultimate Attribution Error .....	30
Attributions, Types of Policies, and Policy Preferences .....	34
CHAPTER FIVE: STUDY 1 .....	42
Overview .....	42
Methods.....	42
Results.....	47
Conclusion .....	59
CHAPTER SIX: STUDY 2 .....	64
Overview .....	64
Methods.....	66
Results.....	76
Conclusion .....	105
CHAPTER SEVEN: STUDY 3 METHODS.....	111
Overview .....	111
Methods.....	118
Stimulus Messages.....	123
Measures .....	126
Conclusion .....	138

CHAPTER EIGHT: STUDY 3 RESULTS.....	139
Opinions about Personalized Medicine and Race-Targeted Medical Care .....	142
Causal Attributions for Heart Disease (External and Internal) .....	152
Health Policy Preferences (Distributive and Regulatory).....	155
Summary .....	179
Conclusion .....	183
CHAPTER NINE: CONCLUSION .....	192
Summary of Results .....	193
Limitations and Directions for Future Research .....	205
Implications of Research Findings.....	208
APPENDIX A: STUDY 1 STIMULUS MESSAGES AND QUESTIONNAIRE.....	242
APPENDIX B: STUDY 2 STIMULUS MESSAGES AND QUESTIONNAIRE.....	245
APPENDIX C: STUDY 3 STIMULUS MESSAGES.....	248
APPENDIX D: STUDY 3 QUESTIONNAIRE .....	250
APPENDIX E: PROJECT DESIGN FOR PUBLIC OPINION, DELIBERATION AND DECISION MAKING ABOUT GENETICS RESEARCH (GPOD).....	258
APPENDIX F: STUDY 2 AND STUDY 3 SAMPLE CHARACTERISTICS...	259

## LIST OF TABLES

Table 5.1. Distribution (%) of Baseline Opinions about Genetically Targeted Care.....	48
Table 5.2. Group Differences in Favorability toward Genetically Targeted Care by Race.....	49
Table 5.3. Group Differences in Mean Responses to GTC Favorable by Ideology and Race.....	51
Table 5.4. Group Differences in Mean Responses to Race Favorable by Ideology and Race.....	51
Table 5.5. Summary of Multiple Regression Analyses Predicting GTC Favorable (Model 1) and Race Favorable (Model 2).....	53
Table 5.6. Group Differences in Mean Responses to GTC Favorable by Education and Race.....	55
Table 5.7. Group Differences in Mean Responses to Race Favorable by Education and Race.....	55
Table 6.1. Assignment of Participants to Treatment Group by Race.....	77
Table 6.2. Group Differences in Phase 1 Attitudes toward Genetically Targeted Care between African Americans and Whites in the Racial Cue Condition.....	80
Table 6.3. Group Differences in Phase 2 Attitudes toward Genetically Targeted Care between African Americans and Whites in the Racial Cue Condition.....	81
Table 6.4. Group Differences in Favorability toward Genetically Targeted Care between African Americans and Whites.....	82-83
Table 6.5. Distribution (%) of Baseline Opinions about Genetically Targeted Care.....	84
Table 6.6. Analysis of Variance Results for Main Effects and Interaction Effects of Treatment and Race on Favorability toward Genetically Targeted Care (Phase 2).....	86

Table 6.7. Analysis of Variance Results for Main Effects and Interaction Effects of Treatment and Race on Concerns about Genetically Targeted Care (Phase 2).....	88
Table 6.8. Zero-Order Correlations among Political Ideology, Education, Racial Attitudes, and Outcome Measures.....	90
Table 6.9. Mean Responses to Good Way, Benefit, and Get Test by Political Ideology (Phase 2).....	92
Table 6.10. Mean Responses to GTC Would Benefit People Like Me by Treatment Group and Racial Attitudes (Phase 2).....	98
Table 8.1. Mean Favorability toward Personalized Medicine and Race-Targeted Medical Care by Intergroup Racial Cue and Controllability Attribution.....	145
Table 8.2. Zero-Order Correlations among Controllability Attribution, Causal Attributions, and Policy Preferences.....	157
Table 8.3. Mean Support for Distributive Policies by Intergroup Racial Cue and Controllability Attribution.....	164
Table 8.4. Mean Support for Regulatory Policies by Intergroup Racial Cue and Controllability Attribution.....	165
Table 8.5. Zero-Order Correlations among Education, Racial Attitudes, Political Ideology, Favorability toward Personalized Medicine, Causal Attributions, and Policy Preferences.....	169

## LIST OF FIGURES

Figure 5.1. Mean Responses to Race Favorable by Education and Race.....	56
Figure 6.1. Interaction Effect of Treatment Condition and Education for Beliefs that GTC is a Good Way to Personalize Medicine.....	94
Figure 6.2. Interaction Effect of Treatment Condition and Education for Concerns that GTC Will Limit Access to Medical Treatment among African Americans.....	96
Figure 6.3. Interaction Effect of Treatment Condition and Education for Concerns that GTC Will Limit Access to Medical Treatment among Whites.....	96
Figure 6.4. Interaction Effect of Treatment Condition and Science News on Beliefs that GTC Would Benefit People Like Me.....	100
Figure 6.5. Interaction Effect of Treatment Condition and Science News on Concerns that GTC Will Limit Access to Medical Treatment.....	102
Figure 7.1. A Model of the Predicted Main Effects of Controllability Attribution and Interaction Effect of Controllability Attribution and Intergroup Racial Cue on Audiences' Causal Attributions, Opinions about Personalized Medicine, and Policy Preferences.....	117
Figure 7.2. A Model of the Predicted Main Effects of Intergroup Racial Cue on Audiences' Causal Attributions, Opinions about Personalized Medicine, and Policy Preferences.....	117
Figure 8.1. Interaction Effect of Controllability Attribution and Racial Attitudes on Favorability toward Personalized Medicine.....	149
Figure 8.2. Interaction Effect of Intergroup Racial Cue and Racial Attitudes on Favorability toward Race-Targeted Medical Care.....	151
Figure 8.3. Interaction Effect of Intergroup Racial Cue and Race on Distributive Policy Preferences.....	163
Figure 8.4. Interaction Effect of Intergroup Racial Cue and Racial Attitudes on Distributive Policy Preferences.....	172
Figure 8.5. Interaction Effect of Controllability Attribution and Political Ideology on Distributive Policy Preferences.....	177

Figure 8.6. Interaction Effect of Controllability Attribution and Political Ideology on Regulatory Policy Preferences.....	178
Figure 8.7. Summary of the Results of Regression Models Predicting Respondents' Causal Attributions for Heart Disease and Health Policy Preferences.....	182



## **CHAPTER ONE: INTRODUCTION**

Since the completion of the Human Genome Project, knowledge about the genetic basis of many traits and common diseases has increased substantially (Kessler et al., 2007). Soon after the human genome was officially declared sequenced on April 14<sup>th</sup>, 2003, the National Human Genome Research Institute (NHGRI) published a blueprint of the next stage of the genomic era that highlighted as a central goal the development of robust strategies for identifying the genetic contributions to disease and drug responses (Lee, 2003). As progress in the field of genetics continues to occur at a rapid pace, there is growing concern about the social and ethical consequences of these advances. Certainly, new discoveries on genetic traits and genetic health risks may substantially impact public opinion and health policy preferences. One ethical area of concern that merits additional empirical research is the impact of messages linking genetic traits with racial differences (Lee, 2003). In the modern age of genetics, the power of race as an exploratory model in medicine and health may operate in ways previously unseen. It is important to consider the social and ethical implications of these modern developments, including the ways that media messages about genetics may inadvertently foster greater social inequality and exacerbate health disparities among minority racial groups.

This dissertation sets out to examine the effects of messages about genetics, race, and health on public opinion about personalized medicine and health policy. This study examines the impact of racial cues and controllability attributions on audience's opinions about current health issues related to genetics and personalized medicine. The

dissertation addresses an important area of research because recent studies have shown that casting race as a biological marker can provide justification for a racially inequitable status quo and for the continued social marginalization of historically disadvantaged groups (Williams & Eberhardt, 2008). Moreover, media messages that label certain racial groups as carriers of a disease or trait gene are likely to have significant consequences for people's health behavior and their broader social environments (Serretti & Artioli, 2006).

To date, communication research on the effects of messages about genetics, race, and health has been limited. Despite concerns about the social consequences of the genetics revolution, there has been a lack of empirical work on the impact of media messages associating genetic disease traits with particular racial or ethnic groups. Many of the social and ethical implications of modern advances in the field of genetics and personalized medicine remain largely unknown. Yet, recent developments in the field of genetics and increasing awareness about the use of race as a proxy for genetic similarity may substantially impact public opinion about personalized medicine and related health/science policies. News media reports about health and medical advances may play an important role in the way citizens understand modern issues in genetics and personalized medicine. This dissertation sets out to address questions about the role of the media in shaping public opinion about genetics, personalized medicine, and health policies.

## ***Overview***

Recent studies have revealed that the genetics revolution has introduced a slew of ethical, social, and policy issues (Eltis, 2007). One area of concern is the modern application of race to understand genetic differences in health, medical treatment and drug efficacy. In the absence of cost effective and ubiquitous genome scanning tests, a growing number of medical researchers and practitioners are advocating the use of race-based genetic selection for diagnosing, screening, and prescribing medical drugs (Condit & Bates, 2005). “Although the Human Genome Project seemed to confirm the fallacy of a genetic basis of ‘race,’ the use of race in understanding human genetic variation has become a central focal point in the development of tools in genomic research and medicine” (Lee, 2003, p. 385). Although scholars express concern over the potential deleterious effects of linking genetic traits or health risks with particular racial/ethnic groups, there is a lack of empirical research on the impact of messages about genetics, race, and health on public attitudes and beliefs, as well as health policy preferences.

This dissertation sets out to address this gap in the literature by examining the effects of messages about genetics, race, and health on public opinion about genetic testing and personalized medicine, as well as related health policies. The study examines the effects of racial cues and controllability attributions on audiences’ opinions and health policy preferences. This research consists of three studies: 1) a pilot study (Study 1) that examines the contrast effects (within-subjects) of racial cues on opinions about personalized medicine and race-based medicine among Whites and African Americans; 2) an experiment (Study 2) designed to replicate the findings from Study 1 using a

between-subjects factorial design and a larger sample of participants with an oversample of African Americans; and 3) an experiment (Study 3) using a 2 x 2 x 2 between-subjects factorial design to test the effects of message controllability attributions and intergroup racial cues on audiences' causal explanations for heart disease, opinions about personalized medicine and race-targeted medical care, and health policy preferences.

## CHAPTER TWO: GENETICS, RACE AND MEDICINE

### *Messages about Genetics and Race*

The association between genetics and race has captured the attention of scholars and the popular press. Controversy erupted recently in response to remarks by James D. Watson, Nobel Prize winner and co-discoverer of the structure of DNA. In the fall of 2007, Watson asserted that Africans have innately lower intelligence; although he later apologized for his comments, Watson's statement sparked fervid debates over race, genetics and I.Q. The ensuing public debate has shown that, along with the promise of assuaging the scourge of disease, the so-called genetic revolution has imported a slew of thorny human rights issues that touch on matters such as privacy, discrimination, dignity, disclosure, and the social stigma potentially deriving from genetics and genetic testing (Eltis, 2007, p. 282).

Despite growing concern about the consequences of messages linking genetics with differences among racial/ethnic groups, a review of the literature finds that very few studies have investigated the effects of messages about genetics, race and health. Only a handful of studies, mostly conducted by Celeste Condit and her colleagues, have begun to examine message effects regarding genetics and race. Research in this area indicates that specific wording, rather than general content, is an important element in the effects of messages about genetics (Condit & Parrott, 2004; Condit, Parrott, Bates, Bevan, & Achter, 2004a; Condit, Parrott, Harris, Lynch, & Dubriwny, 2004b; Abramsky & Fletcher, 2002; Baty, Kinney, & Ellis, 2003). Racial cues in messages about genetics and

health have been shown to influence audiences' opinions and racial attitudes. One experiment conducted by Condit and her colleagues (2004a) found that participants who received a public service announcement that specified either 'Whites' or 'Blacks' as the subject of a message about genetics and health demonstrated elevated levels of racism, genetic basis for racism, and one dimension of genetic discrimination, as compared to those that received a version that contained no race specification and a no-message control. The researchers note, however, that it remains unknown what message components might mitigate these effects, and whether the findings would hold for a general, representative sample.

Research has also revealed that attitudes regarding genetic discrimination may show complex response patterns to media messages about genetics (Condit & Bates, 2005). In an experiment by Condit and Williams (1997), participants were exposed to one of two modified news stories about people with genetic diseases. Participants exposed to the less discriminatory version of the story produced less negatively 'judgmental' responses to a scale measuring discriminatory affect, as compared to those exposed to a story that used a more prejudiced presentation. The stimulus materials were assembled using direct quotations from magazine articles; the less discriminatory version of the story was based on quotes from magazine articles published from 1989 to 1992, and the more discriminatory article was developed using direct quotes from magazine articles published from 1970 to 1975. The results showed that the less discriminatory article reduced negative judgmental attitudes among participants. The scholars concluded that "the challenge for social policy then becomes not to erase genetics

discourse...but rather to discuss carefully what forms of medicalized discourses are most beneficial” (Condit & Williams, 1997, p. 232-233).

More scholarship and experimental research is needed to disentangle the various effects of media frames, racial cues, and other message elements on public opinion about genetics and personalized medicine, as well as related policy preferences. The literature reflects growing concerns about the ways media coverage of genetics may influence public attitudes toward social groups and increase discriminatory and deterministic attitudes (Condit, Ferguson, Kassel, Thadhani, Gooding, Parrott, et al, 2001; Condit, 1999; Conrad & Weinberg, 1996). “Critics believe that media coverage fosters the perception that genes are ‘all powerful’ determiners of human characteristics and that this conceptual system supports those who believe that existing inequalities are the product of natural differences rather than socially created inequalities and therefore are not amenable to social remediation” (Condit, et al., 2001, p. 38). Additional empirical work is certainly needed to assess the various ways that media messages linking genetics, race and health may impact or shape public opinion and health disparities.

### ***Public Opinion about Genetics and Race***

Public attitudes about issues related to genetics and race are complex, confounded by a lack of understanding and misinformation about genetics, as well as a history of racial/ethnic discrimination in medicine in the United States. Research indicates that most of the U.S. public is at the early stages of forming beliefs and attitudes about genomics and the media are largely influential in citizens’ awareness and understanding of genetics (Smith, 2007). Studies also indicate that there is a lack of public

understanding about various genetics-related concepts; and genetic conditions are often regarded by the public and many social institutions as extremely serious, disabling, or even lethal conditions, without regard for the fact that many individuals with ‘abnormal’ genotypes may be perfectly healthy, have medical conditions that can be controlled by treatment, or experience only mild forms of disease (Billings, Kohn, de Cuevas, Beckwith, Alper, & Natowicz, 1992). Scholars contend that an individual may suffer serious consequences as a result of the ‘inaccurate and unfair simplification of genetic conditions’ (Billings, et al., 1992, p. 480).

The literature indicates that the consequences of public attitudes about genetics may extend beyond the individuals with genetic traits or health conditions, particularly when these individuals belong—or are externally perceived as belonging—to a vulnerable or minority racial/ethnic group (Eltis, 2007). Research has shown that lay people believe that race has a genetic basis and that physical appearance is largely caused by genetics (Condit et al., 2004b). Moreover, as Green and Thomas (1998, p. 584-585) state:

[A] distinctive aspect of DNA-derived information is that it is potentially shared by members of larger ethnic, racial or other communities beyond the individual or family. Sickle-cell anemia is associated with persons of African descent, Tay-Sachs disease with persons of Ashkenazi Jewish heritage, and Mediterranean fever with Armenians. The history of eugenic abuses provides a frightening illustration of how easily group stigmatization can result from the misuse of such genetic information. Increases in knowledge from DNA-derived information intensify the potential for these abuses and possibly create new forms of stigmatization or discrimination. Serious harms for members of communities occur if genetic information is utilized to reinforce prejudice against existing classes of people (so-called ‘demic’ discrimination) and/or to create new classes of genetic ‘untouchables.’



Although scholars express concern over the potential for stigmatization and discrimination to occur in response to linking diseases with particular racial and ethnic groups, there has been a lack of empirical research on how messages about genetics, race and health may impact people's attitudes and beliefs, as well as existing health disparities. Advances in personalized medicine and growing awareness about the use of race as a proxy for genetic similarity may substantially impact public opinion and health policy preferences.

### ***Personalized Medicine and Race-Based Medicine***

While recent advances in gene-sequencing technology have opened the doors to new forms of personalized medicine, most physicians and medical researchers continue to categorize people along racial and ethnic lines, rather than focusing on individual-level genetic differences. In recent years, there has been a growing movement in medical genetics research and practice to develop, implement, and promote a model of race-based medicine (Condit & Bates, 2005). This practice involves classifying people and their health risks according to racial or ethnic groups in the absence of individual genetic profiles. Pharmacogenomics has also emerged as a key vehicle ushering in the new era of personalized medicine. Pharmacogenomics is a burgeoning field of research aimed at elucidating the genetic basis for differences in drug efficacy and toxicity. Often described in utopian terms, gene-sequencing technology and pharmacogenomics are predicted to result in the creation of a new line of medical therapeutics tailored to individual genetic signatures (Lee, 2003). For the time being, however, a substantial amount of pharmacological research has focused on differences across racial or ethnic

groups. Race-specific or racially-targeted medical care draws its rationale from the presumption that the frequencies of genetic variants influencing the efficacy of a given drug are substantially different among races (Cooper, Kaufman, & Ward, 2003).

Given the challenges associated with the creation and maintenance of personal genetic profiles, for the time being scientific researchers and doctors are likely to continue to rely on groupings that are more easily identifiable, such as race. As Lee (2003, p. 385) notes, “Despite the often repeated statement that humans share 99.9% of their genetic makeup, the growing number of privately and publicly funded cell repositories collecting DNA samples from racially indentified populations reflects the increasing salience of the relationship between race and genes.” Similarly, Condit and Bates (2005) contend that “in an effort to generate nearer-term applications of genetic research, a rapidly escalating number of medical researchers are advocating the use of race-based genetic selection for diagnosing, screening, and prescribing drugs” (p. 98). Today, physicians routinely make clinical decisions that assume genetic differences based on individuals’ perceived race (Lee, 2003). “In the absence of cost effective, ubiquitous genome scanning tests, it may be more accurate to describe the next wave of genomic medicine as population-based, rather than one focused on individual differences” (Lee, 2003, p. 385). Yet, although race can help to target medical screening for a disease-associated mutation that is present at a high frequency in one population and is virtually absent in another, it is impossible for race as we recognize it clinically to provide both perfect sensitivity and specificity for the presence of a DNA-sequence variant (Cooper, Kaufman, & Ward, 2003).

Race is therefore at best an imprecise proxy for genetic similarity, which raises medical as well as ethical and social issues. For one, race in itself may be a problematic proxy for genetic similarity in the application of personalized medicine and genetics research. Scholars note that although the history of human migration and dispersion throughout the world has led to the current array of human populations, genetically based population groupings are not easily translatable onto the grid of race (Lee, 2003). Moreover, race-based medicine may promulgate greater health disparities across racial and ethnic groups. Condit and Bates (2005) explain that if race-based medicine becomes a widely disseminated standard of care, it may exacerbate health disparities in two ways: 1. greater attention to biological differences along racial lines may further worsen the discriminatory treatment accorded by some medical personnel to members of minority groups, and 2. race-based medicine may increase the relatively high levels of distrust that minorities already hold toward the medical profession. The scholars conclude that “the potential of race-based medicine to increase health disparities in these ways depends on attitudes about race, and messages about genetics may shape these attitudes” (Condit & Bates, 2005, p. 98). It is therefore important to examine the social implications of associating genetic differences with racial/ethnic groups.

### ***Genetic Discrimination and Genetic Determinism***

Genetic discrimination and genetic determinism are important ethical concerns raised by modern medical advances in genetics and personalized medicine. The literature suggests that genetic discrimination and genetic determinism are closely tied to racial attitudes and may have implications for public opinion about genetics, health, and

personalized medicine, as well as related health policies. Genetic discrimination is defined as “discrimination against an individual or against members of that individual’s family solely because of real or perceived differences from the ‘normal’ genome of that individual” (Billings et al., 1992, p. 477). Condit and Bates (2005) describe genetically discriminatory attitudes as “hierarchical responses to a person or group of persons based exclusively on their genotype” (p. 99). Genetic determinism relates to the belief that genes have a high level of influence on human characteristics. A classic example of genetic determinism is the Nazi’s use of eugenics to ground discrimination against Jews and other non-Aryans; unfortunately, this form of discrimination has not been abolished, and “even today, beliefs in genetic variation among different ‘races’ are routinely used by racists as evidence in favor of discriminatory programs or against programs that ameliorate historical and structurally based discrimination” (Condit & Bates, 2005, p. 98).

Certainly, the fact that genetic differences exist among humans is indisputable; while such differences only account for .01% of the genome when comparing individuals, differences between racial and ethnic groups increase to approximately 15% (Lee, 2003). Research indicates, however, that a large eugenic prejudice exists among the public—founded in the myth of genetic perfection (Billings et al., 1992; Billings, 1989; Suzuki & Knudtson, 1989). People tend to assume that the best possible family and marital partner is the one least likely to face medical adversity, associating the ‘perfect’ family with a disease-free genome; yet, in reality, this ideal does not exist because all families and individuals are at some kind of genetic health risk (Billings et al., 1992).

The wide-ranging consequences of genetic discrimination and determinism, for both the individual concerned and society as a whole, have been explored by a burgeoning body of research. The literature reveals that genetic discrimination has been recognized internationally as a human rights issue that bears considerable social, legal, and policy implications. After all, “discrimination against individuals on the basis of genetic factors has the potential to generate significant social, health and economic burdens for society as it diminishes the opportunities of genetically at-risk individuals in a range of contexts...and for some, may also impact upon potentially helpful engagement with preventive genetic medicine” (Otlowski et al., 2003, p. 1). Research has shown that access to insurance, employment and social entitlements may be limited because of genetic discrimination, and “it is clear that unfair and discriminatory uses of genetic data already occur under current conditions” (Billings et al., 1992, p. 481). “Without further changes in social attitudes, legal protection, and/or changes in the prevailing American health care system, many healthy and potentially productive members of our society will suffer genetic discrimination” (Billings et al., 1992, p. 482).

Citizens’ concerns about genetic discrimination and genetic determinism, particularly among minority groups, have been reflected in public opinion and focus group research. One telephone survey of patients from four inner-city health centers, found that African Americans were more likely than Caucasians to agree that genetic testing will lead to racial discrimination, after socio-demographic controls (Zimmerman, Tabbarah, Nowalk, Raymund, Jewell, Wilson, & Ricci, 2006). The study also found that African Americans were more likely to agree with the idea that genetics research is

tampering with nature and unethical. Another study revealed significant differences in concerns about abuses of genetic testing for cancer among African Americans, Latinos and Caucasians (Thompson, Valdimarsdottir, Jandorf, & Redd, 2003). Thompson et al. (2003) found that African Americans were more strongly in agreement with concerns about genetic-related abuses, as compared to Caucasians. The study also found significant differences in the perceived disadvantages of genetic testing for cancer across racial groups, with post-hoc comparisons revealing that Latinos more strongly agreed with genetic testing disadvantages compared to Caucasians.

The past experiences of minority groups likely augment concerns about discrimination as a consequence of modern advances in medical technology and genetics. History has shown that medical progress may introduce new biological and social labels (e.g., ‘carrier’), with substantial social and institutional consequences that remain largely unknown. The potentially deleterious effects of linking genetic disease traits with race may be amplified by demographic and socioeconomic differences, which contribute to the health status of racial minorities. As Link and Phelan (2006) explain, variables such as socioeconomic status are intrinsically linked to health status because they affect an individual’s exposure to disease risks and protective factors. Across history, “socioeconomic status has had a robust association with disease and death: people with greater resources of knowledge, money, power, prestige, and social connections are generally better able to avoid risks and to adopt protective strategies” (Link & Phelan, 2006, p. 529). The effects of communicating about progress in genetics and personalized medicine is an important consideration, because the failure to address these topics

appropriately can lead minority racial groups to further mistrust and/or avoid the healthcare system in general and genetic testing in particular (Zimmerman et al., 2006).

## CHAPTER THREE: MESSAGE EFFECTS

### *Message Framing*

In order to examine the effects of messages about genetics, race, and health on public attitudes and policy preferences, it is important to consider the features of messages that may shape public opinion on these matters. A central component of this dissertation research is framing, which refers to a cue or set of cues in a message that imply a way of thinking about an issue. Over all, frames are considered the basic building blocks by which issues or problems are socially constructed (Lawrence, 2000). As Entman (1993, p. 52) describes, “To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation and/or treatment recommendation for the item described.” Framing provides an explicit context, within which texts are interpreted, and through these interpretations judgments are rendered and information is recalled (Cappella & Jamieson, 1997, p. 42). In other words, the ways in which citizens understand an issue, which features of it are central and which are peripheral, is reflected in how the issue is framed (Kinder & Sanders, 1996).

News frames, one type of media frame, have been shown to influence the public’s understanding of current events, issues and policy preferences. A news frame is “the central organizing idea for news content that supplies a context and suggests what the issue is through the use of selection, emphasis, exclusion, and elaboration” (Tankard, Hendrickson, Silberman, Bliss, & Ghanem, 1991, p. 3). Moreover, news media frames



are “those rhetorical and stylistic choices, reliably identified in news that alter the interpretations of the topics treated and are a consistent part of the news environment” (Cappella & Jamieson, 1997, p. 39). With regard to policy issues, a news frame represents a particular logic or organizing principle with which a given policy conflict is described in media reports, suggesting particular themes, interpretations, and terms by which a given conflict should be understood (Lee, McLeod, & Shah, 2008).

News media framing plays an integral role in citizens’ understanding of modern developments in health and science, with the capacity to influence opinions, levels of issue salience, and comprehension. By activating some ideas, feelings, and values rather than others, the news media can encourage particular trains of thought about contemporary events and issues (Price & Tewksbury, 1997). Research has shown that the way the news media frames issues plays a crucial role in the public’s perceptions about health and science topics (Nisbet & Hume, 2006; Nisbet et al., 2002; Brodie et al., 2003). Studies have also revealed that “more than half of the public says that national, local, or cable news is their most important source of health information” (Brodie et al., 2003, p. 927). By providing information to many Americans, the news media have the capacity to influence the salience of contemporary health issues for a large number of citizens (Brodie et al., 2003). As Sankofa and Johnson-Taylor (2007) state, “Health news coverage and dissemination is an influential aspect of health promotion and disease prevention among the public” (p. 43).

In terms of policy preferences, research has also shown that news framing influences audiences’ attribution of responsibility for both the creation of problems and

their treatment (Iyengar, 1987, 1991). Cappella and Jamieson (1997, p. 44) note that the interaction between news frames and knowledge structures “is the locus of interpretation and judgment.” Different types of news frames tend to evoke different interpretations and judgments among audiences. Iyengar (1991) hypothesized that the type of media framing influences how audiences attribute responsibility for issues or events, with potential implications for related policy support. Whereas episodic news frames depict public issues in the form of concrete instances, thematic news frames describe a more abstract level of events in the form of general outcomes. Iyengar’s (1987, 1991) research found that episodic framing leads people to make more internal causal attributions (e.g., blaming the individual), and thematic framing results in greater external causal attributions (e.g., blaming society or the government). However, Iyengar’s work does not address the controllability (controllable-uncontrollable) dimension of attribution effects; moreover, his research focuses on attributions as an outcome of framing rather than policy opinions per se, although those attributions were examined based on the assumption that they would lead to policy preferences (Jeong, 2008).

Research has also shown that framing effects may tip the balance of public opinion with regard to issues of race and race-related policies. Richardson (2005) found that news framing about the use of race in university admissions decisions had differential effects on audiences depending on whether a news editorial framed the issue as promoting diversity or as remedial action. In addition, Kinder and Sanders (1990, 1996) have provided compelling evidence that the framing of survey questions on government policies about race affects public opinion toward those policies. In one

experiment, Kinder and Sanders (1996) found that a framed version of a survey question that included dominant supportive and oppositional frames for government policies about race, when compared to a ‘stripped’ version of the survey question with no frames, elicited more opinions, more consequential opinions (e.g., opinions that predicted evaluations of political figures), and opinions more firmly rooted in antecedents (e.g., interests, group resentments, political principles) stressed by the frame. Other experiments conducted by Kinder and Sanders (1996) showed that people were more likely to support government assistance programs that would benefit African Americans *and other minorities*, rather than solely African Americans. The scholars also found that respondents were more likely to support government assistance programs when they would benefit poor people, rather than explicitly African Americans.

### ***Framing and Priming Theory***

Media framing is closely related to the concept of priming and racial priming. Framing involves cues within a message that prime whole groups of connected concepts shared by the audience. In the news media domain, framing focuses on *how* issues and other objects of interest are reported in the news, whereas priming focuses on *what* is emphasized in such reporting. According to Price and Tewksbury (1997), priming and framing share an important theoretical dimension: both approaches to research are joined by a basic interest in the ability of media messages to alter patterns of knowledge activation. Priming works via accessibility effects, while framing works via applicability effects. As applied to the media, priming refers to the effects of the content of the media on people’s later behavior or judgments related to the content (Roskos-Ewoldsen,

Roskos-Ewoldsen, & Carpentier, 2002). In other words, media priming refers to the possibility that messages may affect the relative weights for criteria used in determining an attitude, opinion, or behavior induced by a message” (Cappella, Fishbein, Hornik, Ahern, & Sayeed, 2001, p. 222). Recent experimental research has shown that priming and message framing can have a powerful impact on the meanings conveyed to audience members (Graber, 2005).

The theoretical bases for media priming are cognitive activation and changes in accessibility (Cappella et al., 2001). According to network models of memory, priming works by the spread of activation between related nodes (e.g., concepts) in memory (Roskos-Ewoldsen, Klinger, & Roskos-Ewoldsen, 2007). The presentation of a message stimulus having a particular meaning ‘primes’ other semantically-related concepts, thereby heightening the likelihood that thoughts with much the same meaning as the stimulus will come to mind (Fiske & Taylor, 1991). Exposure to a message increases the availability of information presented in that message, and the more available and accessible the information, the more it influences audiences’ attitudes, norms, and efficacy beliefs (Iyengar & Kinder, 1987). However, priming of audience cognitions does not necessarily change attitudes, opinions, or behaviors, but rather can make the primed objects more accessible from memory, and to the extent that the primed cognition has a mental association with other related cognitions, those too should be activated and made more accessible (Cappella, Lerman, Romantan, & Baruh, 2005).

In the health arena, the priming theory has been tested in a variety of contexts, including beliefs about marijuana use (Yzer et al., 2003), social norms regarding condom

use (Ybarra & Trafimow, 1998), and beliefs about susceptibility to smoking addiction (Cappella et al., 2005). Cappella and his colleagues (2005) assessed the effects of priming beliefs in genetic susceptibility to smoking addiction on smokers' inferences about their own susceptibility to smoking addiction, efficacy to quit smoking, and intention to get a genetic test for addiction and susceptibility. Studies in this area share a central focus on the effects of priming on peoples' beliefs, attitudes and judgments about health topics. This research is distinct from more traditional health communication research on persuasion and behavior change. Whereas persuasion focuses on media messages advocating particular positions, priming can occur simply by exposure to a media message (e.g., a news story about heart disease) that focuses on an issue without necessarily advocating a specific position (Miller & Krosnic, 1996).

### ***Racial Priming, Stereotypes and Prejudice***

Studies on media priming have also examined the effects of priming stereotypes and prejudiced attitudes. In the health domain, several empirical studies have shown that advertisements have the capacity to prime social stereotypes (see Roskos-Ewoldsen, Roskos-Ewoldsen, & Carpentier, 2002). Pechmann and Ratneshwar (1994), for example, found that adolescents' exposure to antismoking magazine advertisements resulted in more negative judgments of the teenager that smoked, compared with exposure to other advertisements (a control condition and a cigarette advertisement). The scholars also found that the priming stimulus influenced judgments of the smoking teenager that were consistent with the participants' stereotypes of smokers (e.g., lacking common sense and being immature) (see also Pechmann & Knight, 2002).

Research on the effects of priming stereotypes is closely related to empirical work on priming prejudice and racial priming. Studies in this area examine how the media environment reinforces or primes negative attitudes about groups with lower life chances in American society (Mendelberg, 2008). The literature reveals that media messages have the capacity to prime racial stereotypes (Valentino, 1999; Valentino, Traugott, & Hutchings, 2002). A substantial amount of research in this area has centered on racial priming theory (Mendelberg, 2001), which predicts that cues in the information environment activate or deactivate citizens' racial predispositions, with consequences for people's opinions and policy preferences. Mendelberg's model takes into account the effects of both implicit and explicit appeals in priming racial attitudes. In addition, the theory suggests that when people make judgments about an issue, racial cues that associate the issue with a particular racial group can lead people to apply their views of other racial groups to form opinions or judgments. Research has shown that racial cues can evoke negative associations even among those that are motivated to resist making such associations (Devine, 1989).

Although surveys reveal that the number of citizens who endorse derogatory statements against minority racial groups or support overtly anti-minority policies has declined over the last several decades, recent scholarship suggests that a new form of subtle prejudice and racism has arisen in the United State (Virtanen & Huddy, 1998). "In part because of changing norms and the Civil Rights Act and other legislative interventions that have made discrimination not simply immoral but also illegal, overt expressions of prejudice have declined significantly over the past 35 years" (Dovidio &

Gaertner, 2000, p. 315). However, evidence of racial disparity and discrimination continues to exist (Gaertner & Dovidio, 2005), and one possible explanation for this phenomenon is a change in the nature of racial prejudice from traditional, overt prejudice to more subtle forms of racial prejudice.

New conceptualizations of racial prejudice or racism have taken on a number of different labels in the literature. One area of research that is conceptualized and measured in similar ways includes *symbolic racism* (Sears, 1988), *modern racism* (McConahay, 1986), *racial resentment* (Kinder & Sanders, 1996), and *subtle racism* (Pettigrew & Meertens, 1995). These theories all share an underlying assumption that among Whites, new forms of prejudice embody negative feelings toward African Americans as a group combined with a sense that African Americans violate cherished American values (Henry & Sears, 2002). Another line of research concerns *aversive racism* (Gaertner & Dovidio, 1986, 2005; Kovel, 1970). Aversive racism is based on the idea that evaluations of racial/ethnic minorities are characterized by a conflict between Whites' endorsement of egalitarian values and their unacknowledged negative attitudes toward racial/ethnic out-groups; unlike more traditional forms of racism that are characterized by overt hatred for and discrimination against racial/ethnic minorities, aversive racism is characterized by more complex, ambivalent racial expressions and attitudes (Gaertner & Dovidio, 1986). For these more subtle forms of prejudice, discrimination is expressed in indirect and rationalizable ways, but the consequences of such actions or judgments may be as significant for minority groups and as pernicious as

the consequences of traditional, overt forms of discrimination (Dovidio & Gaertner, 2000).

Research has also shown that individual differences may function as moderators in the observed effects of racial priming, particularly with regard to race-relevant beliefs and cognitions. According to Dovidio and Gaertner's (1998) integrated model, conservatives are typically more likely to express symbolic racism, whereas liberals are more likely to exhibit aversive racism. Whereas aversive racism suggests that Whites may be biased against assisting African Americans when that behavior can be justified in nonracial terms (Henry & Sears, 2002), research has also shown that Liberal Whites often respond with favoritism toward African Americans and display reverse-discrimination with regard to overtly racial issues (see Saucier, Miller & Doucet, 2005). Studies have also shown that self-reported racial attitudes or prejudice can influence people's perceptions of racial progress and race-relevant policies (Amodio, Devine, & Harmon-Jones, 2008; Brodish, Brazy, & Devine, 2008).

Although there is an ongoing debate in the literature over the precise nature of the effects of implicit racial cues in political messages (see Mendelberg, 2008, and Huber & Lapinski, 2006), a substantial body of research has documented that racial cues in media messages can have important consequences for audiences' opinions, attitudes, and policy preferences. For example, Valentino, Hutchings, and White (2002) found that subtle racial cues in political advertisements primed racial attitudes as predictors of candidate preference by making them more accessible in memory. Valentino and his colleagues (2002) manipulated political advertisements sponsored by President George W. Bush



regarding government spending and found that the impact of racial attitudes on preferences for Bush over Gore increased for those exposed to racial priming advertisements, especially for participants in an ‘undeserving African Americans’ condition. The scholars also found that exposure had no effect on the impact of non-racial attitudes such as individualism.

In another study, Power, Murphy, and Coover (1996) found that media exposure to stereotypical information in a newsletter about either African Americans or women influenced subsequent judgments of unrelated media events concerning the target group. With regard to attributions, Power and her colleagues (1996) found that a counter-stereotypic portrayal of a male African American led participants to subsequently make more external attributions of responsibility for African American males involved in unrelated media events, whereas stereotypic portrayals led to more internal attributions. Similarly, counter-stereotypical depictions of a female tended to increase the perceived credibility of females involved in unrelated media events (e.g., resulting in higher ratings in Anita Hill’s credibility in the Clarence Thomas sexual harassment hearings), and stereotypical depictions decreased their perceived credibility (e.g., as evidenced by lowered ratings of Hill’s credibility). Interestingly, the study also uncovered an intergroup bias by gender in audiences’ interpretation of the media events, with females tending to be more sympathetic toward other females portrayed in the news media coverage (Power et al., 1996).

## CHAPTER FOUR: ATTRIBUTIONS IN MEDIA MESSAGES

### *Attribution Theory*

For nearly 40 years, attribution research has examined the tendency of people to explain behavior by making correspondent inferences (Kenworthy & Miller, 2002, p. 693). According to attribution theory (Heider, 1958; Kelley, 1967, 1973; Weiner, 1976, 2006), people seek causal explanations for the events that occur in their environment.

The attribution framework deals with the processes by which people give causal interpretations to events in their surroundings, what the interpretations are, and the consequences of these interpretations (Griffin & Sen, 1995). The attribution literature specifies three underlying properties of causal explanations in terms of meaningful dimensions whose utility has been demonstrated in several studies; the three dimensions are: locus of control, stability, and controllability (Islam & Hewstone, 1993).

Controllability (uncontrollable vs. controllable) and locus of control (internal vs. external) are complimentary dimensions that are both pertinent to the study of messages about genetics, health and personalized medicine. Controllability refers to whether or not a cause is under the control of a person. Locus of control, also called locus of causality, refers to whether the cause is something about an individual (internal) versus something external to that person (Islam & Hewstone, 1993).

According to the attribution framework, individuals are usually viewed as less responsible for their behavior or condition in cases of external and uncontrollable rather than internal and controllable attributions. Whereas external factors are considered

beyond an individual's control, internal factors are generally considered within a person's control, efforts or abilities (Tygart, 2000). Scholars note, however, that studies often confound internal and external attributions with controllability (Jeong, 2008). Research on the issue of poverty, for example, has regarded attribution to individuals as controllable and internal, whereas attribution to society has been regarded as uncontrollable and external (e.g., Reutter, et al., 2006). Yet, an internal attribution may be conceptualized as controllable or uncontrollable, particularly with regard to health issues such as heart disease. In the health domain, lifestyle-based explanations are generally perceived as controllable whereas genetic or biological explanations of health are typically perceived as uncontrollable factors.

Certainly, many common diseases, including heart disease, can be framed as a controllable health risk that is largely determined by lifestyle choices (e.g., diet and exercise) and/or as an uncontrollable health risk that is largely determined by factors such as genetics and heredity. Focus group research reveals that the public views uncontrollable factors (e.g., genes, environment) and controllable factors (e.g., personal behavior) as all playing some part in the likelihood of contracting a disease (Parrot, Silk, & Condit, 2003). Epidemiological studies have documented that both controllable and uncontrollable factors may increase a person's risk for heart disease (Silbeberg, 1992; French et al., 2000). In terms of locus of control, research has also shown that people make a variety of causal attributions about heart disease, including internal attributions (e.g., personal behavior, smoking) and external attributions (e.g., fate, luck, stressful life events) (French et al., 2001). With regard to heart disease, attributions related to genetics

may be considered internal and uncontrollable, whereas attributions related to diet or physical activity may be considered internal and controllable.

The literature suggests that the public perceives genes and genetic traits as uncontrollable, internal factors in a variety domains, including homosexuality, obesity, and heart attacks (Tygart, 2000; Jeong, 2007; Affleck, Tennen & Croog, 1987; French, Marteau, Senior, & Weinman, 2000; French, Senior, Weinman, & Marteau, 2001). Causal factors are an important consideration for research on a range of health outcomes, including heart disease. A meta-analysis of research on the causal attributions of heart disease found that ‘lifestyle’ factors (e.g., personal behavior, habits, overindulgence) was the most frequently cited attribution for heart disease; and the lifestyle attribution was also at the top of a list of ‘most important’ attributions for heart disease (French et al., 2001). External/uncontrollable attributions of fate/luck appeared among the top nine attributions cited for heart disease, however, genetics did not rank on the list. It would be interesting to consider whether, in recent years, genetics has climbed on the list of commonly cited attributions for heart disease, given the rapid developments and progress made in the field of genetics research since the completion of the Human Genome Project. With the rise of genetic testing, it is reasonable to believe that genetic factors have gained more ground in the public’s understanding about risk factors for common diseases such as heart disease.

### ***Media and Causal Attributions about Social Issues***

Although early attribution research typically overlooked the role of communication processes, more recently studies have examined communication channels

as important means for people to learn about and understand the external forces that affect other people's behavior, which might otherwise be undetectable without the media and interpersonal communication (Tygart, 2000). Research has found that mediated depictions of events, both fictional and factual, can impact real-life attributional judgments made by audiences. For one, studies involving television programs and movie films have shown that media portrayals of fictional characters can have real-world attributional effects on audiences. Research on college students' viewing of television programs, such as soap operas, has shown that exposure to these fictional portrayals was associated with students' understanding of characters' motives as well as their own interpersonal communication patterns (Perse & Rubin, 1989; Lemish, 1985).

In addition, a study by Griffen and Sen (1995) found that audience viewing of various popular Vietnam War films related to the attributions audiences made for problems facing Vietnam veterans when they returned home from the war. The study revealed that exposure to different types of attributions in films about the Vietnam War led audiences to make different causal attributions and policy judgments. Films that incorporated external and uncontrollable attributions such as those focusing on situational factors experienced by Vietnam soldiers (e.g., *Full Metal Jacket* or *Platoon*) tended to result in more external causal attributions for the problems of Vietnam veterans. Conversely, movies that involved more traditional depictions of the war (e.g., *The Green Beret* or *Apocalypse Now*) were associated with greater internal attributions for the problems of Vietnam War veterans. In terms of policy implications, Griffen and Sen (1995) found that more external attributions led to stronger preferences for more

government help for Vietnam veterans, and more internal attributions led to stronger preferences for veterans to help themselves more.

Research has also shown that exposure to non-fictional media content such as news coverage of current events also influences audiences' attributional processes. For example, Iyengar and Kinder (1987) found that television news coverage that attributed events to the actions of the President affected viewers' perceptions of the event; when the news stressed the president's role in events, viewers did so as well. Interestingly, studies also indicate that the media channels people use as sources of news may influence attribution processes as well. Sotirovic (2003) found evidence that television news use was *positively* associated with internal or individualistic attributions about criminal acts, whereas newspaper use was *negatively* associated with such attributions. Sotirovic (2003) accounted for these findings based on the unique characteristics of each media source. Television news typically focuses on the stories of individuals through compelling narratives; however, newspapers usually provide more in-depth coverage that includes more contextual, detailed information. The literature therefore indicates that media content, particularly episodic versus thematic framing, produces differential attribution effects that influence public opinion and public policy preferences.

### ***Intergroup Attribution and Ultimate Attribution Error***

A substantial body of research on attributions has examined the notion of bias as it relates to intergroup attributions and attribution errors. The literature indicates that in-group biases are ubiquitous; even when people are arbitrarily divided into generic groups based on trivial criteria they tend to favor their own in-group (Chatman & von Hippel,

2001). “The evaluation of one’s own group is determined with reference to specific other groups through social comparison in terms of value-laden attributes and characteristics” (Tajfel & Turner, 1979, p. 40). People tend to interpret the behavior of in-group members as more favorable, while out-group behavior is attributed to negative internal dispositions and important situational factors are ignored; the reverse is the case in attributing the causes of less desirable behavior (Tygart, 2000). Mass et al. (1995) even found evidence of a linguistic intergroup bias that pervades languages. The researchers note that a good behavior is described as a general disposition for an in-group person, but the same behavior by the out-group is considered an isolated incident (Mass et al., 1995).

One mechanism that has been used to explain biased attributions across groups is ‘intergroup attribution.’ Intergroup attribution refers to the ways that individuals, as members of salient social categories, explain the behavior or conditions of in-group and out-group members (Kenworthy & Miller, 2002). As Gaertner and Dovidio (2005, p. 618) note, “This mere classification of people into the in-group and out-groups is sufficient to initiate bias.” Research shows that attributions at the group level are often ethnocentric and group-serving, as individuals tend to favor members of their own group rather than members of out-groups. This bias, labeled the ultimate attribution error (or group attribution error), has been replicated in a variety of contexts over the past three decades (Allport, 1954; Pettigrew, 1979; Allison & Messick, 1985; Islam & Hewstone, 1993; Taylor & Jaggi, 1974; see also Hewstone, 1990, and Kenworthy & Miller, 2002). The ultimate attribution error holds that people attribute positive in-group and negative out-group behaviors or events to dispositional causes, but attribute negative in-group and

positive out-group behaviors or events to situational causes. As a consequence of the ultimate attribution error, people can maintain their in-group favoritism even in the face of inconsistent evidence (Chatman & von Hippel, 2001).

Scholars have theorized about the functions of the ultimate attribution error, in terms of both in-group benefits and negative social consequences. Research has outlined two potentially distinct in-group benefits derived from this type of bias: 1) attributing in-group negative occurrences and out-group positive occurrences to external causes may function to preserve or protect group self-esteem, and 2) making internal causal attributions for in-group positive occurrences and out-group negative occurrences may promote or enhance group-esteem (Weber, 1994; Hewstone, 1990). Pettigrew (1979) and others have also suggested that the ultimate attribution error plays an important role in the maintenance of stereotypes and prejudice (for a review, see Hewstone, 1990). As Tygart (2000, p. 262) explains, “The European theories of prejudices and intergroup behavior have focused on the in-group principle,” especially with regard to group-serving biases.

According to both theory and empirical research, people make use of stereotyping, group categorization, and other simplifying techniques in order to navigate their complex social environments (Tajfel, 1981, 1982; Tajfel & Turner, 1979). A significant consequence of these cognitive processes is discrimination against perceived out-groups (Tajfel, 1970). A growing body of research reveals that under certain conditions, group-based stereotypes may be activated quite automatically in the presence of group-relevant stimuli (Devine, 1989; Perdue et al., 1990; Kawakami, Dion, & Dovidio, 1998; Valentino, 1999). Moreover, research has convincingly shown that when



people are grouped based on naturally occurring social category memberships, such as race and ethnicity, a variety of implicit and explicit biases emerge that favor in-groups over out-groups (Hilton & von Hippel, 1996; Chatman & von Hippel, 2001).

The role of ultimate attribution error in exacerbating racial stereotypes and prejudice remains a paramount concern raised by the attribution literature. Across various contexts, race has been shown to be an identifying factor of out-groups that can vividly stimulate the attention of other groups (Tygart, 2000). One study of White college students found that situational or external attributions were preferred to explain the actions of a 'harm-doer' when the target was described as White; conversely, White participants tended to make dispositional or internal attributions when the target was described as African American (Duncan, 1976). Similarly, another study found that White participants made more dispositional than situational attributions for a high-achieving White target and a low-achieving African American target (Jackson, Sullivan, & Hodge, 1993). White participants in the study also made more situational than dispositional attributions for a low-achieving White target and a high-achieving African American target.

Although research by Duncan (1976) and Jackson et al. (1993) has examined race-related attribution effects using a sample of only White respondents, studies involving samples of diverse racial backgrounds have also found similar results. For example, Stephan (1977) examined attributions across three racial groups (Mexican Americans, African Americans, and Whites) and found that in-group members made more dispositional attributions to positive behaviors and fewer dispositional attributions

to negative behaviors than out-group members; the study revealed that the strongest intergroup attribution occurred among Mexican Americans and Whites. In addition, Chatman and von Hippel (2001) examined attributions among African Americans and Whites, and found that both racial groups were subject to in-group biases in their causal attributions, and these attributions at least partially accounted for biased evaluations of in-group and out-group individuals.

### ***Attributions, Types of Policies, and Policy Preferences***

Research on intergroup biases is complemented by research on public policy preferences. Weiner's (1974, 2006) model of attribution-responsibility-action proposes that a person is generally more willing to help others when the cause of a problem or social issue is perceived as more external and/or uncontrollable, but less willing to help others when the cause is considered more internal and/or controllable. Recent formulations of the model include cultural and individual differences (e.g., political ideology) as moderators of attribution processes (Weiner, 2006; Jeong, 2008). Although Weiner's model primarily focuses on the effects of attributions on an interpersonal level, a review of the literature on public policy research highlights several ways that attributions may affect broader policy opinions. For one, studies show that people's opinions about various forms of government spending or policy support are often affected by their attitudes concerning the targets of such policies (Nelson & Kinder, 1996). Scholars find that public opinion about policy issues is affected, at least in part, by citizens' feeling (or attributions) about the policy issue's 'targets' (Jacoby, 2000).

The literature reveals that intergroup attitudes are among the most powerful predictors of people's opinions about public policies (Kinder & Sanders, 1996; Nelson & Kinder, 1996). "Public opinion on matters of government policy is group-centric: shaped in powerful ways by the attitudes citizens possess toward the social groups they see as the principal beneficiaries (or victims) of the policy" (Nelson & Kinder, 1996, p. 1055-1056). Research suggests that when people identify individual behaviors as the cause of a problem or issue, they attribute responsibility to address the issue to the individual, yet when people identify external or uncontrollable factors as the cause, they are more likely support social or governmental responsibility or interventions to remedy the problem or issue (e.g., Kinder & Sanders, 1990, 1996; Dovidio & Gaertner, 1981). In the public health arena, perceptions about the reasons for illness and health disparities, and by extension, who or what is responsible to ameliorate them, may be particularly important factors for public acceptance of policy strategies to address health disparities (Gollust, 2008).

Scholars also contend that message framing is particularly effective at increasing group-centrism and the tendency to base policy decisions on the group given prominence in a media frame (Hurwitz & Peffley, 2005). Studies of issue framing (e.g., Lee, McLeod, & Shah, 2008; Druckman, 2001; Nelson & Kinder, 1996) demonstrate that frames affect policy opinions by making certain considerations seem more important than others, thereby affecting the way people judge a given policy issue (Hurwitz & Peffley, 2005). Message frames are certainly influential in guiding attributions and policy opinions. Framing can have powerful effects on the determinants of attitudes toward the

issues and targets of public policies; a policy issue frame can induce self-interest effects among people who benefit from certain forms of governmental action, or reduce interest among those that may not directly benefit (Jacoby, 2000).

Research indicates that causal attributions can affect the public's beliefs about policies designed to address a variety of social and health issues (Iyengar, 1991).

Intergroup biases are also important ingredients in people's causal attributions and policy opinions regarding social and health issues. Scholars draw on theories related to intergroup biases in order to examine the concept of moral inclusion-exclusion.

According to Staub (1990), groups and/or individuals are considered within the circle of moral inclusion when a person feels a moral duty to assist them; those outside the group, however, are excluded from the group's moral responsibilities (Tygart, 2000). Citizens' beliefs about their moral responsibility to help others (or lack thereof) can certainly have implications for their degree of support for various social policies.

The concept of moral responsibility is linked to beliefs about fairness and justice, factors that may influence a person's support for public policies (Feather, 1998).

Historically, the term 'social justice' has been used by those seeking to alter or redistribute the burdens and benefits within society according to the principle of need (Beauchamp, 1980). Considerations about social justice are closely tied to social policy. As Feather (1998, p. 528) notes, "The way in which individuals react to events and outcomes that relate to themselves or to other people is often associated with their perceptions of justice and injustice." People's judgments about their perceived responsibility and others' deservingness are central to the social justice equation. As

Beauchamp (1976) describes, the notion of social justice is based on values such as shared social responsibility; in contrast, the idea of market justice is based on ideas about individual responsibility and minimal collective action. Whereas social justice holds that all persons are entitled equally to key ends such as health protection, market justice does not recognize a general obligation to protect the individual against disease and injury (Beauchamp, 1979).

The distinction between social justice and market justice relates to theoretical work related to public policy. The literature indicates that the *type* of policy is a valuable consideration for social scientific research. In his seminal work, Lowi (1964) outlined a typology of policies that has subsequently been described as a ‘heuristic device par excellence’ (Anderson, 1997). Lowi’s typology suggests that policies are identifiable because they fall within categories. Two categories that Lowi outlines with implications for public health and policy are: regulatory and distributive policies. Regulatory policies tend to regulate individuals’ conduct through obligation or punishment; as Lowi (1964) states, “the impact of regulatory decisions is clearly one of raising costs and/or reducing or expanding the alternatives of private individuals” (p. 690). Distributive policies are characterized by the sharing of resources and benefits in society, with similar normative components as the social justice model. As Heckathorn and Maser (1990) discuss, regulatory policies are based on the idea of primary rule, which imposes obligations or positions on individuals. In contrast, distributive policies are based on the secondary rule, which confers power or privileges across society.

Attributions are related to Lowi's (1964) typology of public policies, as internal and controllable attributions are more likely to be linked to support for regulatory or discriminatory policies, and external and uncontrollable attributions are more likely linked to support for distributive or supportive policies. Based on a review of the literature, it is reasonable to expect that attributions in media messages will have similar consequences for people's policy opinions. Presumably, media messages that frame issues according to the primary rule will be more likely to elicit internal and controllable attributions and lead audiences to favor regulatory/discriminatory policies, whereas media framing based on the secondary rule will be more likely to guide external and uncontrollable attributions and increased support for distributive/supportive policies. Studies also indicate that individual differences, such as political ideology and racial attitudes, may mediate the relationship between media attributions and policy preferences. Pan and Kosicki (1996), for example, provide evidence that Whites who were ideologically conservative were more likely to make internal/controllable attributions about racial disparities, although this effect was moderated by information-oriented media use. The scholars also found that ideology played a stronger role in attributions and policy opinions among those who were characterized as high in information-oriented media use or high need for cognition (e.g., individuals who read more newspapers, follow public affairs, and have higher political knowledge).

Racial differences and intergroup biases have also been shown to have important implications for public opinion and policy preferences. The literature reveals substantial differences between African Americans and Whites on questions about government

support for African Americans (Kinder & Winter, 2001). There is a general pattern whereby overwhelming majorities of African Americans support liberal policy options and majorities of Whites tend to oppose them. “On these matters, opinion differences between Blacks and Whites add up to more than a gap or a mere disagreement,” these differences “constitute a *divide*” (Kinder & Winter, 2001, p. 440, italics as they appear in text). Moreover, these differences in policy opinions are not necessarily confined to issues of race. Kinder and Winter (2001) found that African Americans and Whites also differed sharply in their opinions about a variety of domestic programs, such as expansion of government services or cuts in federal spending, federal spending on education, federal spending for the poor, federal spending for the unemployed, federal spending for the homeless, government provision of health insurance, and government provision of jobs. Across various types of social welfare policies, African Americans were consistently more liberal than Whites, and the differences were substantial (Kinder & Winter, 2001). However, it is possible that many of these measures of opinions about social welfare policies implicitly primed racial attitudes and intergroup biases, and thus the similar patterns of responses to the social welfare and race-related policy questions by racial group may be less surprising.

Certainly, a substantial body of research supports the idea that racial attitudes are closely related to policy opinions. Valentino, Traugott, and Hutchings (2002) provide evidence that even subtle racial cues can influence support for various ‘racialized’ policy issues, such as welfare, affirmative action, and crime policy. Yet, the scholars find that exposure to racial cues did not impact opinions about issues less relevant to race, such as

abortion, spending on public schools, universal health care, and raising the minimum wage. Research also suggests that the media's over-representation of African Americans among the poor relates to White Americans' negative attitudes about helping people in poverty through welfare programs (Gilens, 1999). Gilens contends that White Americans' stereotypes regarding those in poverty, such as that they are lazy, led to their antipathy toward certain types of welfare programs. Moreover, a study by Shelton (2005) found that a target person's race was a consistent predictor of the public's causal attributions toward the target and support for redistributive welfare policies. Other studies have shown that in the case of crime, support for punitive or regulatory policies such as the death penalty increased significantly when Whites were informed that the criminal perpetrator was non-White, rather than White (Gilliam & Iyengar, 2000). It is therefore reasonable to expect that racial attitudes and intergroup attributions may influence people's causal attributions and policy opinions via judgments of responsibility. However, it remains unclear whether and how racial cues in media messages will affect people's opinions about genetics, personalized medicine, and related policy preferences.

Thus, a central empirical question that remains unanswered is how attributions and racial cues affect people's perceptions of genetics, personalized medicine, and health/science policies. Do racial cues and intergroup biases influence public opinion about genetics, personalized medicine and health? How do attributional frames in news media coverage of common diseases, such as heart disease, impact people's opinions about personalized medicine, genetics, and related health policies? This dissertation sets out to address these questions by studying how messages about disease, genetics, and



health influence public opinion and policy preferences. Although the literature generally offers support for the idea that media framing impacts people's policy opinions as a consequence of attribution processes, very few studies have examined these issues in the context of genetics and personalized medicine. More research is needed to unravel the effects of media messages involving racial cues and controllability attributions on people's opinions about genetics and health/science policy preferences.

Based on a review of the literature, it is expected that racial cues and controllability attributions will influence people's support for personalized medicine and related health policies via judgments about self-interest and personal responsibility. The literature indicates that messages that highlight an individual's in-group status and the uncontrollable nature of disease will lead respondents to express greater support for genetics and personalized medicine. Conversely, messages that highlight a person's out-group status and the controllable nature of disease will lead to less support for genetics and personalized medicine. In other words, research indicates that framing a health message as particularly beneficial for one's in-group and emphasizing the uncontrollable nature of a common health problem will lead audiences to express greater favorability and support for public health initiatives to address a given health problem. The following section begins to examine these ideas in the context of genetics and medicine by presenting the results of a pilot study on the effects of message framing and racial cues on audiences' opinions about genetic testing and personalized medicine.

## CHAPTER FIVE: STUDY 1

### *Overview*

Study 1 was a pilot study designed to evaluate the contrast effects (within-subjects) of message framing and racial cues on public opinion about personalized medicine and race-based medicine among African Americans and Whites (refer to Appendix A for stimulus messages and questionnaire). The study was embedded in the Annenberg National Health Communication Survey (ANHCS) as a module during three consecutive months in March, April, and May of 2008. ANHCS is a monthly survey that is designed to assess national trends related to media and health.

### *Methods*

#### *Participants*

Participants were drawn from a nationally representative sample of American adults (18 years or older) retained by Knowledge Networks. Knowledge Networks maintains a research panel that is representative of the U.S. population; respondents in the panel are recruited based on a probability sampling technique (random digit dialing; RDD). The sample of subjects who participated in this study was chosen through stratified random sampling from the Knowledge Networks panel, and the sampling procedure was performed by Knowledge Networks.

A sample of 215 adults (18 years or older) participated in Study 1. Approximately half of the sample (49%) was female. 32% of participants had a bachelor's degree or higher, 31% had some college, 30% were high school graduates, and

7% had less than a high school education. The average age of respondents was about 47 ( $SD = 15.6$ ). 36% of participants were self-identified Whites (non-Hispanic), 19% were self-identified African Americans (non-Hispanic), 18% were self-identified Hispanics, 17% identified themselves as bi-racial and about 10% identified themselves as other races. This study focuses on comparisons of all non-Hispanic Whites and African Americans in the sample ( $N = 118$ ); for the purposes of analysis, respondents that did not self-identify as either White or African American ( $N = 97$ ) were excluded from the study.

### *Procedure*

All participants completed the study online. Subjects received an email invitation to participate in the study. For those subjects who did not have access to the Internet, a Web TV appliance was provided with proper operating instructions. Participants were able to read the study materials and answer all of the questionnaire items online. This study was part of a larger survey developed by the gPOD research team that was included in the ANHCS module and administered by Knowledge Networks. Prior to exposure to the stimulus messages, respondents completed a questionnaire as part of the Knowledge Networks profile data. The questionnaire included measures of several background variables such as age, race, gender, education, religion, political ideology and political partisanship. For this study, White respondents were randomly assigned from the Knowledge Networks panel to participate. Due to the smaller number of African American respondents available in the panel, all African Americans were assigned to participate in this study.

After completing the core questionnaire, all participants in Study 1 read an

introductory statement about personalized medicine (‘genetically targeted care’) and filled out several questionnaire items on the subject. The term genetically targeted care was developed to provide participants with a neutral term that avoids any positive bias that may be associated with the word ‘personalized.’ Participants then read a racial cue message that introduced the topic of race-based medicine. To this point in the study, there had been no mention of race. Participants were then asked to complete a series of questionnaire items on their opinions about using race to provide genetically targeted care (or race-based medicine).

### *Stimulus Messages*

The introductory statement in Study 1 offers a general description of genetically targeted care. This statement read:

“Some doctors are using genetics as a basis for screening, diagnosing, and prescribing medication. This practice is called genetically targeted care. Because of their genetics, people respond better or worse than others to certain medications and medical treatments. Some say that using genetics to personalize medicine is a good way to tailor treatment to individuals and improve their overall medical care. Others say that genetically targeted care will discriminate against people that are less responsive to medication and limit their access to medical treatment.”

The second stimulus message, occurring after the introductory one above, cued race in the context of personalized medicine, or race-based medicine. This message was assigned to all participants in Study 1, and read as follow:

“Currently, it is too costly and difficult for most doctors to obtain genetic profiles for each of their patients. In order to provide their patients with genetically targeted care, some doctors are using race as a substitute for individual genetic profiles because people of the same racial group tend to share many of the same genes.”

## *Measures*

Study 1 was embedded in a monthly survey (ANHCS) and prior to exposure to the stimulus materials, participants provided information on a range of background variables, including: age, race, gender, education, religion, political ideology, and political partisanship. The data reported here are from a subsample of all non-Hispanic Whites and African Americans that participated in the study.

*Political Partisanship and Political Ideology.* Political partisanship was measured by a question that asked: “Generally speaking, do you think of yourself as a...” (1 = strong Democrat to 7 = strong Republican). Political ideology was measured by a survey item that read: “In general, do you think of yourself as .....” (1 = extremely Liberal to 7 = extremely Conservative).

About 58% of the White and African American sample were Democrats (coded as 1 to 3), 40% were Republican (coded as 5-7), and about 2% were Independents or Undecided (coded as 4). Among Whites, 43% were Democrats and 57% were Republicans (none were Independents). African American respondents were mostly Democrats (90%), with only 5% reporting to be Republicans and 5% Independents. With regard to political ideology, about 30% of the total sample of Whites and African Americans considered themselves Liberal (coded as 1 to 3), 36% said they were Conservative (coded as 5 to 7), and 34% were Moderates (coded as 4). Among White respondents, 23% were Liberals, 43% were Conservatives, and 34% were Moderates. 46% of African American participants were Liberals, 20% were Conservatives, and 34% were Moderates.

*Opinions about Personalized Medicine.* Participants' opinions about personalized medicine were measured after the introductory message, and before the racial cue message. To measure general opinions about personalized medicine, participants were asked a forced-choice question: "Which one of the following statements is closest to your viewpoint: 1) Genetically targeted care will improve people's overall medical care, or 2) Genetically targeted care will discriminate against people that are less responsive to medical treatment?" Respondents were asked to select either the first statement (1) or the second statement (2). Next, participants were asked how much they agreed or disagreed with each of the two abovementioned statements; responses to these items were coded on a five point scale from 'Strongly Disagree' (1) to 'Strongly Agree' (5).

In addition, participants were asked how much they agreed or disagreed with each of the following statements: 1) "Genetically targeted care will make no difference in people's lives," 2) "People will not be willing to get a genetic test to find out how well they respond to medical treatment," 3) "Genetically targeted care will limit some people's access to medical treatment," and 4) "People will not trust genetically targeted care." Responses to these survey items were coded on a five point scale from 'Strongly Disagree' (1) to 'Strongly Agree' (5).

*Opinions about Race-Based Medicine* were measured after exposure to the racial cue message. These survey items asked participants how much they agreed or disagreed with each of the following statements: 1) "Using race to provide genetically targeted care is a good way to personalize medicine," 2) "Using race to provide genetically targeted care will limit some racial groups' access to medical treatment," and 3) "People like me

would trust medical care that is tailored for them based on their race.” Responses to these survey items were coded on a five point scale from ‘Strongly Disagree’ (1) to ‘Strongly Agree’ (5). Participants were also asked whether they thought genetically targeted care would do: 1) ‘More Harm than Good,’ 2) ‘More Good than Harm,’ 3) ‘Both Harm and Good,’ or 4) ‘Neither Harm nor Good.’

*Interest in the Topic* was measured at the end of the study by two survey items. The first question asked: “How interested would you be in getting more information about this topic?” The second questionnaire item read: “If the opportunity came up, how interested would you be in discussing this topic with others?” The two survey items were coded on a five point scale from ‘Not at all Interested’ (1) to ‘Extremely Interested’ (5).

## ***Results***

The results reported here focus on comparisons of all Whites and African Americans in the sample. As shown on Table 5.1, White respondents were, on average, more likely to believe that genetically targeted care (GTC) would improve people’s overall medical care; African American participants were more divided on this question. The observed difference in opinions between Whites and African Americans in response to this question was statistically significant ( $\chi^2(1, N = 117) = 6.09, p < .05$ ).

Table 5.1.

*Distribution (%) of Baseline Opinions about Genetically Targeted Care*

Baseline Opinion Measure	African American ( <i>n</i> = 41)	White ( <i>n</i> = 75)	$\chi^2$ (1)
GTC will improve people's overall medical care.	54	76	6.09*
GTC will discriminate against people that are less responsive to treatment.	46	24	

\**p* < .05

Likelihood Ratio = 5.97 (*p* < .05)

Two survey questions were examined to assess participants' opinions about GTC before and after exposure to the racial cue stimulus. Survey question #2a measured general opinions about GTC before participants received the racial cue, and asked respondents whether they thought that GTC will improve people's overall medical care (GTC Favorable). Question #4a immediately followed the racial cue stimulus, and asked whether respondents thought that using race to provide GTC is a good way to personalize medicine (Race Favorable). Refer to Appendix A for additional detail on the survey questionnaire. It is important to note that although the two survey items measured general favorability toward GTC before and after exposure to the racial cue, the questions are worded differently and therefore not strictly comparable. Given the differences in question wording and the nature of the within-subjects design, comparisons between GTC Favorable and Race Favorable cannot be unequivocally attributed to the racial cue message in Study 1. However, interesting differences within and between the two survey items are presented here, and are further explored in Study 2 using a between-subjects experimental design.



Table 5.2 depicts the distribution of mean responses to GTC Favorable and Race Favorable between Whites and African Americans. Whereas Whites were in greater agreement with GTC Favorable compared to African Americans, African Americans were in greater agreement with Race Favorable than Whites. The table shows that although Whites initially expressed significantly more positive opinions about personalized medicine than African Americans ( $t(114) = 3.07, p < .05$ ), after the racial cue message Whites expressed significantly more negative judgments about using race to provide personalized medicine (race-based medicine), as compared to African Americans ( $t(115) = -2.09, p < .05$ ).

Table 5.2.

*Group Differences in Favorability toward Genetically Targeted Care by Race*

Favorability Measure - Phase 1	African American		White		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
GTC Favorable: GTC will improve people's overall medical care.	3.07	1.03	3.64	.92	115	3.07**
Race Favorable: Using race to provide GTC is a good way to personalize medicine.	2.90	1.09	2.47	1.07	116	- 2.09*

\* $p < .05$ , \*\* $p < .01$

Note. Responses coded as 'strongly disagree' (1) to 'strongly agree' (5).

To further assess differences in opinions about GTC, participants' responses were examined against background variables (e.g., political ideology, education).

Unfortunately, there were no measures of racial attitudes included in Study 1; in the absence of such measures, political ideology and education were used for the purposes of analysis. Table 5.3 and Table 5.4 compare the distribution of mean responses to GTC

Favorable and Race Favorable (respectively) by political ideology and respondent race. Table 5.3 shows that White Conservatives and Moderates, as compared to White Liberals, were on average slightly more favorable toward GTC prior to the racial cue message (GTC Favorable); however, Table 5.4 reveals that these participants were more opposed to the use of race to provide personalized medicine after exposure to the racial cue message (Race Favorable). The opposite pattern of effect was shown for the African American sample: Conservatives and Moderates were initially more unfavorable toward genetically targeted care (refer to Table 5.3: GTC Favorable), but they were more favorable than Liberal African Americans toward using race to provide genetically targeted care (see Table 5.4: Race Favorable).

Table 5.3.

*Group Differences in Mean Responses to GTC Favorable<sup>1</sup> by Ideology and Race*

	Political Ideology	<i>M</i>	<i>n</i>	<i>SD</i>	% Total N
White	Conservative	3.73	33	.98	30
	Moderate	3.64	25	.86	23
	Liberal	3.50	18	.92	16
African American	Conservative	2.86	7	.90	6
	Moderate	3.00	12	.95	11
	Liberal	3.63	16	.72	14

1. GTC Favorable: "GTC will improve people's overall medical care."

Note. Responses coded as 'strongly disagree' (1) to 'strongly agree' (5).

Table 5.4.

*Group Differences in Mean Responses to Race Favorable<sup>1</sup> by Ideology and Race*

	Political Ideology	<i>M</i>	<i>n</i>	<i>SD</i>	% Total N
White	Conservative	2.36	33	1.08	30
	Moderate	2.38	25	.98	23
	Liberal	2.78	18	1.17	16
African American	Conservative	3.14	7	.90	6
	Moderate	3.33	12	1.07	11
	Liberal	2.63	16	1.20	14

1. Race Favorable: "Using race to provide GTC is a good way to personalize medicine."

Note. Responses coded as 'strongly disagree' (1) to 'strongly agree' (5).

The effects of respondent race and political ideology on favorability toward GTC were also examined using regression. Given the small sample size of some groups, particularly African American Conservatives, political ideology was coded as a dichotomous variable (Conservatives/Moderates vs. Liberals) to stabilize the results of the regression analyses. Table 5.5 shows the results of regression analyses predicting

participants' responses to GTC Favorable (Model 1) and Race Favorable (Model 2) by several demographic variables that were centered to avoid multicollinearity. Model 1A was a statistically significant regression model ( $F(3, 110) = 3.37, p < .05$ ) that predicted GTC Favorable by respondent race, political ideology, and the interaction between race and ideology; Model 1B ( $F(4, 110) = 2.99, p < .05$ ) shows the results of adding education to this regression model. Model 2A was a statistically significant regression model ( $F(3, 111) = 3.45, p < .05$ ) that predicted Race Favorable by respondent race, ideology, and the interaction term; Model 2B ( $F(5, 110) = 2.20, p < .06$ ) depicts the results of adding education and GTC Favorable to this regression model.

As shown on Table 5.5, respondent race and the interaction between race and political ideology accounted for a statistically significant amount of the observed variance in opinions about GTC Favorable and Race Favorable (Model 1 and Model 2, respectively). The results also show that controlling for education did not substantially alter any of the observed relationships, as the omnibus F tests for Model 1B and Model 2B were statistically significant and the original predictor variables (race and the interaction effect) also remained statistically significant. With race and ideology in the models, education did not account for a significant amount of variance in participants' favorability toward either GTC or race-based medicine. In addition, controlling for GTC Favorable in Model 2B did not significantly alter the results. Neither education nor GTC Favorable was shown to significantly influence respondents' favorability when race and

the interaction between race and political ideology were included in the regression models.<sup>1</sup>

Table 5.5.

*Summary of Multiple Regression Analyses Predicting GTC Favorable (Model 1) and Race Favorable (Model 2)*

Independent Variables	GTC Favorable (Model 1)		Race Favorable (Model 2)	
	Model 1A	Model 1B	Model 2A	Model 2B
	(Beta/ t)	(Beta/ t)	(Beta/ t)	(Beta/ t)
White	-.26/ -2.68*	-.26/ -2.63*	.26/ 2.68*	.26/ 2.54*
Ideology	.06/ .59	.04/ .47	.02/ .19	.02/ .21
Education	N/A	.13/ 1.34	N/A	-.11/ -1.14
Ideology x Race	.21/ 2.24*	.23/ 2.37*	-.21/ -2.24*	-.23/ -2.29*
GTC Favorable	N/A	N/A	N/A	.03/.26

\* $p < .05$

Note. Ideology was coded as Conservative/Moderate (1), Liberal (2).

Note. Race was coded as White (1), African American (0).

Overall, the favorability questions revealed interesting findings within each outcome measure by race and ideology, and significant differences between the two questions for Whites and African Americans' opinions before and after the racial cue message. Additional research involving a between-subjects design is needed to assess whether the observed differences can be attributed to the racial cue stimulus message. Comparing responses to GTC Favorable and Race Favorable by race and ideology, White

<sup>1</sup> The Table 4 regression models were also run with political ideology coded as a categorical variable (Conservatives, Moderates, and Liberals); the results were not substantially different than those reported, as the omnibus F tests were all statistically significant, but in some cases the t-tests for predictor variables were less robust.

Conservatives appeared to have the largest mean difference in opinion between the two questions. The result may indicate that the racial cue message had a greater impact on White Conservatives' judgments, but without a control group the results cannot be unequivocally attributed to the stimulus message. However, the suggestion that White Conservatives may react more strongly to a racial cue is supported by the literature, which finds that White Conservatives tend to make internal attributions about racial topics (Pan & Kosicki, 1996) and are more likely to express symbolic racism (Dovidio & Gaertner, 1998). It is possible that the racial cue message prompted Whites, particularly White Conservatives, to conceptualize GTC as a 'race-issue' that was unfavorable or unrelated to their own group- and self-interest. This idea is also supported by the results of two survey questions posed at the end of Study 1, which found that Whites were significantly less likely to be interested in obtaining more information about GTC ( $t(59) = -3.54, p < .05$ ) and discussing the topic with others ( $t(64) = -3.26, p < .05$ ), as compared to African Americans.<sup>2</sup>

The main effects of education were also examined with regard to participants' responses to GTC Favorable and Race Favorable. Table 5.6 and Table 5.7 compare participants' mean favorability toward genetically targeted care and the use of race to provide genetically targeted care, by education level. Table 5.6 depicts the distribution of mean responses to GTC Favorable for Whites and African Americans by education level. Table 5.7 shows the mean responses to Race Favorable by race and education. Whites with higher levels of education were somewhat more favorable toward GTC before

---

<sup>2</sup> Equal variances were not assumed for these two measures of interest in genetically targeted care (GTC).

exposure to the racial cue message but were more opposed to using race to provide GTC, as compared to Whites with less education. African Americans with more education were more favorable toward GTC before and after the racial cue, as compared to African Americans with lower levels of education. On average across all three levels of education, Whites appeared to have less favorable opinions about Race Favorable than GTC Favorable, but African Americans expressed relatively stable opinions across GTC Favorable and Race Favorable.

Table 5.6.

*Group Differences in Mean Responses to GTC Favorable<sup>1</sup> by Education and Race*

	Education	<i>M</i>	<i>n</i>	<i>SD</i>	% of Total N
White	HS or Less	3.50	24	.83	21
	Some College	3.71	28	.90	24
	BA or Higher	3.71	24	1.04	20
African American	HS or Less	2.94	17	1.09	15
	Some College	3.00	13	1.08	11
	BA or Higher	3.36	11	.92	9

1. GTC Favorable: “GTC will improve people’s overall medical care.”

Table 5.7.

*Group Differences in Mean Responses to Race Favorable<sup>1</sup> by Education and Race*

	Education	<i>M</i>	<i>n</i>	<i>SD</i>	% of Total N
White	HS or Less	2.80	25	.96	21
	Some College	2.57	28	1.07	24
	BA or Higher	2.00	24	1.06	20
African American	HS or Less	2.29	17	.99	15
	Some College	3.31	13	.95	11
	BA or Higher	3.36	11	1.03	9

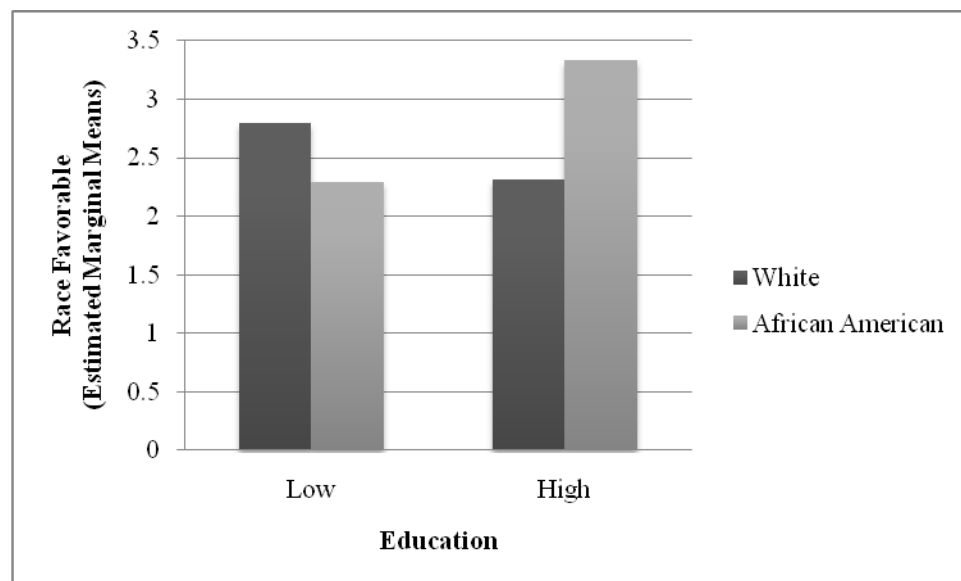
1. Race Favorable: “Using race to provide GTC is a good way to personalize medicine.”

Note: Responses to favorability items coded as ‘strongly disagree’ (1) to ‘strongly agree’ (5).

For responses to the Race Favorable item, there was a statistically significant interaction effect of race by education ( $F(3, 117) = 6.95, p < .001$ ). Figure 5.1 depicts the interaction effect of respondent race (African American vs. White) and education (high vs. low) for opinions about Race Favorable. Whereas African Americans with higher levels of education tended to support Race Favorable, indicating agreement that race is a good way to personalize medicine, Whites with more education strongly disagreed with Race Favorable. Figure 5.1 also shows that Whites and African Americans with low levels of education were fairly close in their opinions about using race to provide GTC. The observed relationship remained statistically significant after controlling for several demographics, including gender, age, political ideology and political partisanship.

*Figure 5.1.*

Mean Responses to Race Favorable by Education and Race





Overall, some of the observed differences in opinions by education and political ideology may be explained by the literature on aversive racism and social desirability bias. Research indicates that aversive racism is characterized by more complex, ambivalent racial expressions and attitudes (Gaertner & Dovidio, 1986). Studies have also shown that White Liberals, and possibly also highly educated Whites, often strive to respond with favoritism toward African Americans and display reverse-discrimination (Saucier, Miller, & Doucet, 2005). Liberal and highly educated Whites were perhaps more sensitized to concerns about overt expressions of racial bias, and they may have assumed that favorability toward using race to provide GTC would be indicative of prejudicial or discriminatory racial attitudes. It remains unclear why African Americans with more education, as compared to those with less education, were typically more in favor of GTC both before and after the racial cue. Perhaps the highly educated African American participants had more preexisting knowledge about genetics and personalized medicine, and/or more exposure to news media coverage of these topics; more generally, these participants may have also been more trusting of the medical system.

In addition to measuring respondents' favorability toward GTC, concerns about discrimination as a consequence of GTC were also measured before and after the racial cue message. Before exposure to the racial cue, GTC Limit (question #3c) measured respondents' agreement with the statement that GTC will limit some people's access to medical treatment. After the racial cue message, Race Limit (question #4b) asked respondents whether they thought that using race to provide GTC will limit some racial groups' access to medical treatment (see Appendix A for additional survey detail). A

regression model was run predicting responses to Race Limit by opinions about GTC Limit, respondent race, and the interaction between GTC Limit and race (with the predictor variables centered to avoid multicollinearity). The omnibus F test for this regression model was statistically significant ( $F(3, 115) = 7.36, p < .001$ ); however, the model showed that the only statistically significant determinant of Race Limit was responses to GTC Limit ( $t(117) = 4.68, p < .001$ ).

Examining responses to the two discrimination-related questionnaire items separately for Whites and African Americans, the regression models confirmed that GTC Limit (centered) was a statistically significant, positive predictor of responses to Race Limit for both racial groups (White sample:  $F(1, 76) = 13.40, p < .001$ , Beta = .39,  $p < .001$ ; African American sample:  $F(1, 38) = 9.00, p < .01$ , Beta = .44,  $p < .01$ ). When background variables (all centered) were included in the regression models as controls (e.g., education, political ideology, and political partisanship), the regression model remained statistically significant for the African American sample ( $F(4, 33) = 2.75, p < .05$ ), and the White sample ( $t(F(4, 76) = 4.60, p < .01$ ). For the African American sample, however, GTC Limit ( $t(40) = 3.2, p < .01$ ) was the only statistically significant predictor of Race Limit. For the White sample, the model showed that GTC Limit ( $t(76) = 3.27, p < .01$ ) and education ( $t(76) = 2.16, p < .05$ ) were *both* statistically significant determinants of responses to Race Limit. The results suggest that, unlike the African American sample, White participants' concerns about genetic discrimination after exposure to the racial cue was a function of both education and baseline opinions. Among the African American sample, education was not a statistically significant

determinant of concerns about race-based medicine; the only significant predictor of concerns about discrimination as a consequence of race-based medicine was the initial concern African Americans expressed about discrimination as a results of GTC.

Results for the combined sample of Whites and African Americans also revealed a statistically significant effect of education for participants' responses to the survey question that measured concerns about discrimination after exposure to the racial cue message (Race Limit). A regression model was run predicting Race Limit by education, race, and the interaction effect, with all predictor variables centered; the omnibus test of this model approached statistical significance ( $F(3, 117) = 2.31, p = .08$ ). In this regression model, education ( $t(117) = 2.50, p < .05$ ) was the only statistically significant determinant of concerns about discrimination with regard to race-based medicine. Moreover, for the combined sample of White and African American participants, those with higher levels of education were significantly more concerned that GTC would limit some racial groups' access to medical treatment, as compared to those with less education ( $F(2, 117) = 4.69, p < .05$ ). The results indicate that across racial groups, people with more education responded to the racial cue by expressing more apprehension about race-based medicine than those with less education; however, the effect of education was most evident among White participants.

## ***Conclusion***

In sum, the pilot study produced several interesting findings and new questions for future research in this area. The study found notable differences between African Americans and Whites in their judgments about GTC before and after a racial cue

message. A central finding of the study was that prior to receiving a racial cue stimulus, White participants expressed more positive opinions about personalized medicine as compared to African Americans. Yet, Whites expressed significantly more negative judgments about using race to provide GTC (race-based medicine), as compared African Americans. The results seemed to indicate that racial cues in messages about personalized medicine may have differential effects on opinions among Whites and African Americans. It is possible that the racial stimulus primed out-group racial status among Whites, thereby diminishing White participants' favorability and interest in GTC. However, the within-subjects design of the pilot study limits the researcher's ability to attribute the observed differences in opinion to the racial cue message. It also remains unknown whether White respondents would have expressed similar judgments about GTC and race-based medicine had their in-group status had been primed with a White racial cue.

Study 1 also revealed interesting differences in opinion by political ideology and education. Political ideology appeared to have the reverse pattern of effects on participants' favorability toward GTC and race-based medicine among Whites and African Americans. Whereas White Conservatives and Moderates were strongly in agreement with GTC Favorable, they were substantially more opposed to Race Favorable. Conversely, Conservative and Moderate African Americans were initially more opposed to GTC Favorable, but more in favor of Race Favorable than Liberal African Americans.

The effects of political ideology may be partially explained by previous research that has shown that individual differences such as ideology and racial attitudes can influence attitudes about various social and racial issues (e.g., Pan & Kosicki, 1996; Dovidio & Gaertner, 1998; Gilliam & Iyengar, 2000; Shelton, 2005). For example, Dovidio and Gaertner's (1998) integrated model considers the relationship between political ideology and racial attitudes among Whites, and theorizes that Conservatives are generally more likely to maintain symbolic racism and Liberals are more likely to maintain aversive racism. Discriminatory racial attitudes among some Whites may have lowered their support for GTC when the topic was made 'racialized' by the racial cue message. The effects of the racial cue message may have also been influenced by intergroup attributions. If the racial cue associated GTC with minority racial interests, then the stimulus message may have led White Conservatives and Moderates to lose interest in and support for this area of medicine. Likewise, the racial cue message may have led African American Conservatives and Moderates to consider the potential benefits for their racial in-group, thereby leading to greater support for Race Favorable. According to the ultimate attribution error, even subtle classifications of people into in-group and out-group categories are sufficient to initiate bias in support of one's own in-group (e.g., Chatman & von Hippel, 2001).

Although the literature may provide explanations for some of the observed differences in opinions between African Americans and Whites regarding GTC, many questions remain unanswered. It is unclear why in some cases African Americans showed the opposite pattern of effects as Whites by political ideology and education.

Unlike Whites, African American Liberals responded to Race Favorable more negatively than Conservative or Moderate African Americans, even after controlling for education. Across the study, education appeared to moderate the effects of respondent race for opinions about personalized medicine. African Americans with higher levels of education were, on average, more in favor of using race to provide personalized medicine, as compared to Whites with equivalent levels of education and African Americans with less education. The data also showed that African Americans and Whites with low education were fairly close in their opinions about race-based medicine. Some of these results may be explained by aversive racism, which holds that evaluations of racial/ethnic minorities are characterized by a conflict between Whites' endorsement of egalitarian values and their unacknowledged negative attitudes toward racial/ethnic out-groups (Gaertner & Dovidio, 1986). Educated Whites may have been more sensitized to concerns about racial bias, and therefore may oppose 'race-based' topics that could appear prejudicial. However, a larger sample of African Americans is needed to assess the stability of the observed pattern of effects, particularly with regard to differences within the African American sample by education and political ideology. The small samples in this pilot study do not allow stable conclusions to be drawn.

More generally, however, the results indicate that African Americans considered GTC in the context of race issues prior to the racial cue, but Whites did not consider GTC as a racial issue before exposure to the racial cue message. It is also possible that some unmeasured background variables such as knowledge about genetics or health media exposure, or latent attitudes such as racial attitudes, may account for some of the pilot

study results. Certainly, more empirical research is needed to assess these claims, including the observed effects and their causal mechanisms. Based on the preliminary findings from this study and a review of literature, it is possible that attributions, intergroup biases, and unmeasured background variables (e.g., preexisting racial attitudes) may account for some differences in opinions between Whites and African Americans, as well as differences within racial groups by education and political ideology. Yet, despite the relatively small sample and limited nature of the pilot study, there is evidence to suggest that racial cues in messages about genetics influence audiences' opinions about personalized medicine. The results also indicate that intergroup biases may interact with message content to influence opinions about personalized medicine and race-based medicine. Study 2 and Study 3 draw on the pilot study results and the literature review to extend this research by examining the between-subject effects of health messages containing racial cues and controllability attributions on the public's opinions about personalized medicine, causal attributions, and health policy preferences.

## CHAPTER SIX: STUDY 2

### *Overview*

Study 1 offered evidence of a relationship between respondent race and opinions about personalized medicine following exposure to a racial cue stimulus message. The study also revealed interesting differences in responses to the stimulus messages by political ideology and education. However, the pilot study used a within-subjects design, and therefore comparisons of participants' opinions about genetically targeted care (GTC) before and after exposure to the racial cue message could not be unequivocally attributed to the racial cue message. Moreover, since measures of racial attitudes were not included in the pilot study, it was unclear whether these latent attitudes accounted for differences in participants' responses to the stimulus messages. In addition, the small sample size in Study 1 limited the researcher's ability to generalize the findings to the general population of Americans.

Study 2 aimed to replicate the findings from Study 1 using a larger, nationally-representative sample of participants, with an oversample of African Americans. The study built on the findings from Study 1 by employing a between-subjects factorial design to examine the comparative effects of a racial cue message and a non-racial cue message on audiences' opinions about personalized medicine. Study 2 also extended the pilot study by incorporating additional background measures, including racial attitudes and attention to news about science and health. Similar to the pilot study, the results of



Study 2 focused on comparisons of all non-Hispanic Whites and African Americans in the research sample.

### *Hypotheses and Research Questions*

The first set of hypotheses for Study 2 concerned the main effects of a stimulus message containing either a racial cue or non-racial cue on audiences' opinions about personalized medicine. Based on the findings from the pilot study and the literature on racial priming (Mendelberg, 2001, 2008), it was hypothesized that a racial cue stimulus message would diminish respondents' favorability toward personalized medicine, particularly among Whites; it was thought that the racial cue would implicitly prime out-group racial status among Whites and lead them to express more negative opinions about personalized medicine.

*Hypothesis 1a:* Exposure to the stimulus messages will lead respondents in the racial cue condition to express more negative opinions about personalized medicine as compared to those in the non-racial cue condition.

*Hypothesis 1b:* White participants in the racial cue condition will have more negative opinions about personalized medicine following exposure to the stimulus message, as compared to Whites in the non-racial cue condition.

*Hypothesis 1c:* The effect of the racial cue message will be greatest among Whites, such that exposure to the stimulus message will lead to more unfavorable opinions among Whites than among African Americans.

*Hypothesis 2:* Race of respondent will moderate the effects of the racial cue message on participants' favorability toward personalized medicine.

Three research questions were posed to examine whether background variables such as political ideology, education, and racial attitudes moderated the effects of the stimulus messages on opinions about personalized medicine.

*Research Question 1:* Are the effects of the stimulus messages on audiences' attitudes toward personalized medicine moderated by political ideology?

*Research Question 2:* Are the effects of the stimulus messages on audiences' attitudes toward personalized medicine moderated by education?

*Research Question 3:* Are the effects of the stimulus messages on audiences' attitudes toward personalized medicine moderated by racial attitudes?

## ***Methods***

### *Design*

Study 2 was an experiment embedded in a large-scale survey developed by the Annenberg research group on Public Opinion, Deliberation and Decision Making about Genetics Research (gPOD). The experimental design was a 2 (racial cue vs. non-racial cue) by 2 (race of respondents: African American vs. White) between-subjects factorial design. The study examined the main effects of racial cues on audiences' opinions about personalized medicine, as compared to a control group that received a non-racial cue message (refer to Appendix B for Study 2 stimulus messages and questionnaire). Study 2 also examined whether individual differences, such as political ideology, education, and racial attitudes, moderated the impact of the stimulus messages on participants' attitudes toward personalized medicine.

Main effects as well as interaction effects were tested using between-subjects factorial analysis of variance (ANOVA) and analysis of covariance (ANCOVA) models. All hypotheses and research questions were tested using two-tailed significance tests. Corrections for experiment-wise error were performed using modified Bonferroni adjustments of the alpha level (i.e., reducing Type I error rates) (Jaccard, 1998). In order to estimate the practical significance of the outcomes, the SPSS generated (v. 15.0) effect sizes were reported (Cohen, 1988). Demographics and other background variables were examined to ensure random distribution of participants across all four experimental conditions. Any relevant background variables that failed to meet the requirements for random distribution were controlled for as covariates in ANCOVA models. Some individual difference characteristics were included in ANCOVA and ANOVA models to test for possible two-way and three-way interaction effects between the experimental manipulations and individual differences on the Study 2 outcome measures.<sup>3</sup>

### *Participants*

A nationally representative sample of adults (18 years or older) participated in this study. Respondents were recruited by Knowledge Networks using a probability sampling technique (random digit dialing; RDD). Knowledge Networks maintains a research panel that is representative of the U.S. population. The sample of participants for Study 2 was

---

<sup>3</sup> As a 2 x 2 design involving over 3,300 participants, including about 750 African Americans, Study 2 had ample statistical power to detect small effect sizes; this is important because, as a new area of research inquiry, effect sizes may be small or modest (Cohen, 1988). Small effect sizes generally account for about 1-2% of variance, and medium effect sizes tend to account for about 6-13% of variance in a dependent variable (Cohen, 1998; Keppel & Wickens, 2004). Assuming a two-tailed test at a .05 significance level and a power of 80%, a sample size of about 135-270 subjects per group was needed to detect small-sized effects (.02-.01, respectively), and about 45 subjects were needed to detect medium-sized effects (.06) (Cohen, 1998; Keppel & Wickens, 2004).

selected through stratified random sampling from the panel, and the sampling procedure was conducted by Knowledge Networks.

A sample of 3,754 adults participated in Study 2. The sample was generally well-educated, as about 41% had a bachelor's degree or higher, 33% had some college or associate's degree, and 26% had a high school education or less. The average age of respondents was about 47 ( $SD = 16.03$ ). In order to test hypotheses concerning racial priming, African Americans were oversampled and a total of 748 African Americans participated in this study. The sample also included 2,569 Whites, 259 Hispanics, and 178 people identifying as other races. African Americans were the only minority racial group that was oversampled in the gPOD project. Accordingly, this research focuses on comparisons of all non-Hispanic White and African American participants ( $N = 3,317$ ); for the purposes of analysis, respondents that did not self-identify as either White or African American ( $N = 437$ ) were excluded from the Study 2 sample.

### *Procedure*

As a module embedded in the gPOD baseline survey, this study was administered by Knowledge Networks during Phase 1 of the gPOD project (refer to Appendix E for more details on the gPOD project design). The survey was fielded during the time period of October 29<sup>th</sup> through November 17<sup>th</sup> of 2008. All participants completed Study 2 online. Participants were able to read the stimulus materials and answer all of the questionnaire items online. For those participants that did not have access to the internet, a Web TV appliance was provided with proper operating instructions.

All participants in Study 2 first read an introductory message and then answered a series of survey items measuring baseline opinions about personalized medicine. Next, a random half sample of participants was assigned to the racial cue message condition (Racial Cue), and the other half of the split sample was randomly assigned to the non-racial cue message condition (Non-Racial Cue). After reading a brief message (either the racial cue or non-racial cue stimulus), all participants responded to an identical set of questionnaire items about genetics and personalized medicine. Refer to Appendix B for the survey questionnaire.

### *Stimulus Messages*

The stimulus messages for Study 2 were based on those from the pilot study. The introductory statement in Study 2 (shown below) was virtually identical to that of Study 1; this statement provided a general description of personalized medicine, referred to as ‘genetically targeted care.’ As previously discussed, the term genetically targeted care was developed to provide participants with a neutral term to avoid any positive bias that may be associated with the word ‘personalized.’ The introductory statement read:

“Doctors are using genetics as a basis for screening, diagnosing, and prescribing medication. This practice is called genetically targeted care. Because of their genetics, people respond better or worse than others to certain medications and medical treatments. Some say that genetically targeted care will discriminate against people that are less responsive to medications and limit their access to medical treatment. Others say that using genetics to personalize medicine is a good way to tailor treatment to individuals and improve their overall medical care.”

A random half sample of participants (Racial Cue) was then assigned to read a racial cue stimulus message about personalized medicine; this message was similar to that of Study 1, and read as follows:

“Some doctors are using race as a substitute for individual genetic profiles because it is too costly and difficult to obtain genetic profiles for each of their patients. In the absence of genetic testing, race is an alternate way to provide patients with genetically targeted care because people of the same racial group tend to share many of the same genes.”

The non-racial cue stimulus message was randomly assigned to the other half of respondents (Non-Racial Cue); this stimulus message was designed to contain similar content as the racial cue message, but with an emphasis on the individualized aspect of personalized medicine as opposed to the racial component. The message read:

“Some doctors are using individual genetic profiles to customize medical treatment to each of their patients. Although individual genetic profiles may be costly and difficult to obtain for each patient, it is a valuable way to provide patients with genetically targeted care because everyone has a unique genetic makeup.”

### *Measures*

Prior to receiving the experimental stimulus messages, participants provided information on a range of background variables, including: race, gender, education, religion, religious service attendance, political partisanship, political ideology, media exposure, and other personality variables. During Study 2, participants read two stimulus messages and responded to a series of questions about genetics and personalized medicine. After participating in Study 2, all subjects were asked to complete the

remainder of the gPOD baseline questionnaire, which included measures of racial attitudes and religiosity.

*Baseline Opinions about Personalized Medicine.* Baseline opinions about personalized medicine were measured after the introductory message, and before participants were exposed to the racial or non-racial cue stimulus message. To measure general opinions about personalized medicine, participants were asked the following forced-choice question: “Which one of the following statements is closest to your viewpoint?” 1. “Genetically targeted care will improve people’s overall medical care,” or 2. “Genetically targeted care will discriminate against people that are less responsive to medical treatment?” Participants were asked to select either the first statement (1) or the second statement (2). Next, participants responded to two questions that asked how much they agreed or disagreed with each of the abovementioned statements; responses to these two items were coded on a five point scale from ‘Strongly Disagree’ (1) to ‘Strongly Agree’ (5). In addition, participants were asked how much they agreed or disagreed with each of the following: 1. “Genetically targeted care will make no difference in people’s lives,” 2. “Genetic testing should be used as a basis for medical treatment,” and 3. “Genetic testing will improve medical care.” Responses to these survey items were coded on a five point scale from ‘Strongly Disagree’ (1) to ‘Strongly Agree’ (5).

*Post-Treatment Opinions about Personalized Medicine.* After exposure to the experimental treatment (the racial cue or non-racial cue message), all participants responded to a set of survey questions about personalized medicine. The items were

designed to capture the between-subject effects of the experimental conditions by measuring attitudes toward positively and negatively valenced statements about genetically targeted care. Participants were asked how much they agreed or disagreed with each of the following outcome measures: 1. “Genetically targeted care is a good way to personalize medicine” (Good Way); 2. “Genetically targeted care will limit some people’s access to medical treatment” (Limit); 3. “People like me would benefit from genetically targeted care” (Benefit); 4. “People will not trust genetically targeted care” (No Trust); and 5. “It is a good idea to get a genetic test to find out how well a person will respond to medical treatment” (Get Test). These outcome variables were conceptualized as two classes of attitudinal measures, with Good Way, Benefit, and Get Test assessing participants’ favorability toward personalized medicine, and Limit and No Trust measuring concerns about personalized medicine.<sup>4</sup> Participants’ responses to the outcome variables were coded on a five point scale from ‘Strongly Disagree’ (1) to ‘Strongly Agree’ (5).

### *Background Variables*

*Political Partisanship and Political Ideology.* Political partisanship was measured in the gPOD baseline questionnaire using a survey item that read: “Generally speaking, do you consider yourself a...” (1 = strong Republican to 7 = strong Democrat).

---

<sup>4</sup> Principal components factor analysis and reliability analysis was conducted on these items. The results for the favorability measures indicated that the three items loaded on one factor (Eigenvalue = 2.11, 70% of variance) and the scale measure of favorability had internal consistency ( $\alpha = .79$ ;  $M = 3.39$ ,  $SD = .76$ ). All analyses were run using the scale measure as well as the individual measures of favorability; the results were consistent across the analyses and therefore the results of the individual favorability items are presented herein to provide greater detail on the research findings. The two measures of concern were not strongly correlated, but the correlation was statistically significant ( $\alpha = .34$ ,  $p < .001$ ). Based on the weak correlation between the concern items, the two measures were analyzed separately for the purposes of analysis.



Political ideology was measured by a question that asked: “In general, do you consider yourself as...” (1 = extremely Conservative to 7 = extremely Liberal).

About 49% of all Whites and African Americans in the sample were some type of Democrat (coded as 5 to 7), 33% were some type of Republican (coded as 1 to 3), and approximately 18% were Independent (coded as 4). Among Whites, 39% were Democrats, 40% were Republicans, and 21% were Independents. African Americans were mostly Democrats (83%), with 6% identified as Republicans and 11% as Independents. With regard to political ideology, about 47% of the total sample of Whites and African Americans considered themselves Liberal (coded as 5 to 7), 33% were Conservative (coded as 1 to 3), and about 20% were Moderate (coded as 4). Among White respondents, 38% were Liberals, 40% were Conservatives, and 22% were Moderates. Among African American participants, 80% were Liberals, 8% were Conservatives, and 12% were Moderates.

*Education.* Participants’ education was coded in years of education (10 = less than a high school education, 12 = high school graduate, 14 = some college/associate’s degree, 16 = bachelor’s degree, 18 = master’s degree, 21 = doctorate or professional degree). Approximately 4% of the sample had less than a high school education, 22% were high school graduates, 33% had some college or an associate’s degree, 24% had a bachelor’s degree, 12% had a master’s degree, and 5% had a doctorate or professional degree.<sup>5</sup> African Americans and Whites were fairly comparable in the distribution of education

---

<sup>5</sup> Although respondents with less than a high school education and those with a doctorate or professional degree constituted a minority of participants, analyses of other demographic variables indicated that they were substantively different from the other groups and therefore they were coded as separate categories of education.

across participants, with the exception that Whites had a higher percentage of high school graduates (24%, as compared to 14% among African Americans), and African Americans had a greater percentage of people with associate's degrees or some college (41%), as compared to Whites (31%).

*Racial Attitudes.* Favorability toward African Americans and Whites was measured using feeling thermometers; the items read as follows: "For each of the following groups, please tell me if your opinion is favorable or unfavorable using a scale from 1 to 100. Zero means very unfavorable, and 100 means very favorable. 50 means you do not feel favorable or unfavorable;" participants were asked to rate their favorability using a slider bar that ranged from 0 to 100. The racial attitudes variable was computed from a combined measure of respondents' attitude toward a racial out-group subtracted from their attitude toward their racial in-group; the combined measure could range from -100 to 100, in increments of 5.<sup>6</sup> For African Americans, the racial attitudes measure was derived from respondents' favorability toward Whites, subtracted from their favorability toward African Americans. For Whites, this measure was computed from participants' favorability toward African Americans, subtracted from their favorability toward Whites.<sup>7</sup>

---

<sup>6</sup> The procedure of intergroup comparison followed Kam and Kinder's (2007) work on ethnocentrism, but the scale items measuring racial attitudes in this study were not the same as the scale items employed by Kam and Kinder.

<sup>7</sup> It should be noted that due to a technical error in the administration of the questionnaire, a random split sample of participants did not receive the racial attitude questions at baseline; these participants received the questions in a follow-up survey fielded from December 15, 2008 to January 15, 2009. Consequently, there was a large portion of missing values (21.3% missing for each measure and for the combined racial attitudes measure). Responders and non-responders were compared at baseline and follow-up; age was the only background variable

The variance in the racial attitudes measure was not normally distributed, as slightly over 42% of the sample fell in the neutral range with a mean score of zero; although the question wording and the online nature of the survey were designed to minimize biases, the results of the racial attitudes measure indicated the presence of a social desirability bias. As a result of the variance and distribution of responses in the measure, racial attitudes were coded categorically in the following four groups: favor out-group (1), neutral/egalitarian (2), weakly favor in-group (3), and strongly favor in-group (4). Participants that rated their racial out-group more highly than their in-group received a score of 1, those that rated both racial groups equally received a score of 2, those that rated their racial in-group slightly more highly than their out-group received a 3, and those that rated their racial in-group substantially higher than their racial out-group received a 4. Approximately 13% of participants were more favorable toward their racial out-group, 42% were neutral/egalitarian, 35% slightly favored their racial in-group, and 10% strongly favored their racial in-group.

*Attention to News Media about Science/Health.* Participants' attention to news media about science and health was measured by a question that asked: "How much attention did you pay to news stories about science or health in the past week?" Responses were coded on a five point scale from 'No Attention' (1) to 'A Great Deal of Attention' (5).

*Religion.* Religious identification was measured by a question that asked: "Which of the following groups best describes your religious preference?" The question was

---

significantly associated with participation, and therefore age was included as a covariate in all analyses involving racial attitudes.

asked of all participants and responses were coded categorically as Baptist (1), Protestant (2), Catholic (3), Other Religion (4), and No Religion (5).

*Evangelicalism.* Participants that described their religious preference as some type of Christianity were also asked, “Would you describe yourself as a born-again Evangelical Christian or not?” Responses were coded dichotomously as Yes (1) and No (0). Participants that were not asked this question (e.g., Non-Christians) were considered not Evangelical and assigned a value of zero.

*Religious Service Attendance* was measured by a question that asked, “In the past three years, how often did you attend religious services?” Religious service attendance was asked of participants that listed a religious preference (e.g., all participants except those that identified with no religion); participants that had no religious identification were assigned a value of zero. Responses to this question were coded as ‘Never among No Religion (0), ‘Once a Year or Less’ (1), ‘A Few Times a Year’ (2), ‘Once or Twice a Month’ (3), ‘Once a Week’ (4), and ‘More than Once a Week’ (5).

## ***Results***

The results reported here focus on comparisons of all Whites and African Americans that participated in the study ( $N = 3,317$ ). For the purposes of analysis, respondents that did not self-identify as White or African American ( $N = 437$ ) were excluded from the study. ‘Phase 1’ refers to the pre-treatment portion of Study 2 and ‘Phase 2’ refers to post-treatment portion of the study after exposure to the stimulus messages. Table 6.1 shows results of the randomized assignment of participants to each treatment group by respondent race; approximately half of all participants were randomly

assigned to each treatment condition. The effect sizes of several background variables on group assignment were examined, including: race, age, gender, income, education, religion, religious service attendance, political ideology, political partisanship, media exposure to science/health news, health locus of control, and need for cognition; there were no sizeable effects found for any of the background variables on group assignment (the partial Eta squared ( $\eta_p^2$ ) values indicated weak/no effects, and for all Pearson correlation coefficients:  $r < .02$ ). However, a significant effect of racial attitudes was observed for assignment to the treatment group, regardless of whether racial attitudes was coded as a full scale measure (-100 to 100) or as a four-category variable. Participants in the racial cue condition were slightly more favorable toward their racial in-group than those in the non-racial cue condition, but the association was weak ( $r = -.05$ ,  $p < .05$ ) and the partial Eta squared indicated a very small effect size ( $\eta_p^2 = .003$ ); therefore, racial attitudes were not controlled for as a covariate in the forthcoming analyses.

Table 6.1.

*Assignment of Participants to Treatment Group by Race*

Treatment Group		African American	White	Total
Racial Cue	<i>n</i> (% of <i>N</i> )	363 (10.9)	1253 (37.8)	1616 (48.7)
Non-Racial Cue	<i>n</i> (% of <i>N</i> )	385 (11.6)	1316 (39.7)	1701 (51.3)
Total		748	2569	3317

### **Hypothesis 1a**

Hypothesis 1a (H1a) predicted that exposure to the stimulus messages would lead respondents in the racial cue condition to express more negative opinions about personalized medicine as compared to those in the non-racial cue condition. The hypothesis was partially supported, as the results of two outcome measures indicated that exposure to the stimulus messages led respondents in the racial cue condition to have more negative judgments about personalized medicine compared to those in the non-racial cue condition. Immediately following exposure to the stimulus messages, participants in the racial cue condition were less favorable toward GTC than respondents in the non-racial cue condition. Results showed a statistically significant main effect of the treatment condition on favorability toward GTC as a good way to personalize medicine ( $t(3666.08) = -3.47, p < .01$ ), such that there was lower mean favorability toward GTC among participants in the racial cue condition ( $M = 3.45, SD = .93$ ) as compared to those in the non-racial cue condition ( $M = 3.55, SD = .86$ ). There was also a statistically significant main effect of the treatment condition for participants' concerns that people will not trust GTC ( $t(3713) = 3.53, p < .001$ ). Participants in the racial cue group ( $M = 3.18, SD = .87$ ) were slightly more concerned about people not trusting GTC than those in the non-racial cue group ( $M = 3.08, SD = .88$ ). There were no other statistically significant main effects of the treatment condition on the outcome measures.

### **Hypothesis 1b**

Hypothesis 1b (H1b) was also partially supported. H1b predicted that White participants in the racial cue condition would have more negative opinions about GTC

following exposure to the stimulus message, as compared to Whites in the non-racial cue condition. There was a statistically significant main effect of the treatment condition for White participants' favorability toward GTC as a good way to personalize medicine ( $t(2524.50) = -3.33, p < .01$ ), such that there was less favorability among those in the racial cue group ( $M = 3.46, SD = .90$ ) than the non-racial cue group ( $M = 3.58, SD = .85$ ). There was also a statistically significant main effect of the treatment condition for Whites' concerns that people will not trust GTC ( $t(2541) = 2.21, p < .05$ ); there was greater concern about issues of trust regarding GTC among Whites in the racial cue condition ( $M = 3.15, SD = .85$ ) as compared to those in the non-racial cue condition ( $M = 3.07, SD = .88$ ). There were no other statistically significant differences between Whites across the two experimental conditions.

Similar to the White sample, there was also a statistically significant main effect of the treatment for African Americans' concerns about people not trusting GTC ( $t(729.80) = 2.56, p < .05$ ). Results showed that there was greater concern about trust issues among African Americans in the racial cue group ( $M = 3.27, SD = .91$ ) than those in the non-racial cue group ( $M = 3.10, SD = .86$ ). There were no other statistically significant differences between African Americans across the two treatment conditions.

### **Hypothesis 1c**

The data did not support Hypothesis 1c (H1c), which predicted that the effect of the racial cue message would be greatest among Whites, such that exposure to the stimulus message would lead to more unfavorable opinions among Whites than among African Americans. There was no evidence that exposure to the racial cue message led to

a reversal (or ‘flip’) in Whites’ favorability toward GTC. Similar to the pilot study, Whites initially expressed more positive opinions about GTC than African Americans; yet, unlike the pilot study, Whites remained more favorable toward GTC after receiving the racial cue stimulus message. Table 6.2 shows the group differences in baseline attitudes toward GTC between Whites and African Americans in the racial cue condition. In Phase 1, Whites expressed greater favorability and fewer concerns about GTC than African Americans. Whites in the racial cue condition were significantly more likely than African Americans to believe that GTC will improve people’s overall medical care ( $t(557.78) = 2.50, p < .05$ ). In contrast, African Americans in the racial cue group were significantly more concerned that GTC will discriminate against people that are less responsive to medical treatment ( $t(1599) = 3.21, p < .001$ ), and that GTC will make no difference in people’s lives ( $t(510.89) = 2.30, p < .05$ ).

Table 6.2.

*Group Differences in Phase 1 Attitudes toward Genetically Targeted Care between African Americans and Whites in the Racial Cue Condition*

Phase 1 Measure	<u>African American</u>		<u>White</u>		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
GTC will improve people’s overall medical care.	3.58	.94	3.73	.90	557.78	2.50*
GTC will discriminate against people that are less responsive to medical treatment.	3.21	1.03	2.88	1.06	1599	- 5.23***
GTC will make no difference in people’s lives.	2.40	.95	2.28	.79	510.89	- 2.21*



Counter to expectations, exposure to the racial cue stimulus message did not reverse Whites' favorability toward GTC. Table 6.3 shows the mean differences in Phase 2 attitudes toward GTC between Whites and African Americans in the racial cue condition. Following exposure to the racial cue message, African Americans continued to express more negative views about GTC than Whites. In particular, African Americans remained more concerned about issues of discrimination and trust regarding GTC after exposure to the racial cue message. African Americans expressed greater concern than Whites that GTC will limit people's access to medical treatment ( $t(1603) = -4.73, p < .001$ ) and that people will not trust GTC ( $t(550.79) = -2.21, p < .05$ ). There were no other statistically significant differences in opinions between African Americans and Whites in the racial cue condition.

Table 6.3.

*Group Differences in Phase 2 Attitudes toward Genetically Targeted Care between African Americans and Whites in the Racial Cue Condition*

Phase 2 Measure	<u>African American</u>		<u>White</u>		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Limit	3.50	.98	3.22	.98	1603	- 4.73***
No Trust	3.27	.91	3.15	.85	550.79	- 2.21*

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Note. Responses coded as 'strongly disagree' (1) to 'strongly agree' (5).

Across treatment conditions, Whites were generally more favorable toward personalized medicine than African Americans. Table 6.4 depicts the main effects of respondent race on opinions about GTC in the combined sample of participants. In Phase

1, Whites were more supportive of the idea that GTC will improve people's overall medical care ( $t(1148.39) = 5.07, p < .001$ ) and that genetic testing will improve medical care ( $t(1136.23) = 3.15, p < .01$ ). African Americans in the combined sample were more concerned that GTC will discriminate against people that are less responsive to medical treatment ( $t(3283) = -7.98, p < .001$ ), and that GTC will make no difference in people's lives ( $t(1089.83) = -3.67, p < .001$ ). In Phase 2, Whites in both treatment groups were more favorable toward the idea that GTC is a good way to personalize medicine ( $t(3287) = 2.08, p < .05$ ). African Americans maintained their more negative views about GTC in Phase 2, and expressed greater concern that GTC will limit people's access to medical care ( $t(3286) = -5.62, p < .001$ ) and that people will not trust GTC ( $t(3282) = -1.97, p < .05$ ). There were no other statistically significant main effects of respondent race on attitudes toward GTC in the combined sample.

Table 6.4.

*Group Differences in Favorability toward Genetically Targeted Care between African Americans and Whites*

Phase 1 and Phase 2 Measure	<u>African American</u>		<u>White</u>		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
GTC will improve people's overall medical care.	3.54	.94	3.74	.90	1148.39	5.07***
GTC will discriminate against people that are less responsive to medical treatment.	3.26	1.05	2.90	1.07	3283	- 7.98***
GTC will make no difference in people's lives.	2.42	.92	2.28	.80	1089.83	-3.67***
Genetic testing will improve medical care.	3.62	.85	3.73	.79	1136.23	3.15**

GTC is a good way to personalize medicine (Good Way).	3.44	.93	3.52	.88	3287	2.08*
GTC will limit some people's access to medical treatment (Limit).	3.48	.96	3.25	1.00	3286	-5.62***
People will not trust GTC (No Trust).	3.18	.89	3.11	.87	3282	-1.97*

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

The results of the forced choice question measuring baseline opinions about GTC in the combined sample underscores that Whites were initially more favorable toward GTC than African Americans. As shown on Table 6.5, Whites were on average more likely to believe that GTC will improve people's overall medical care; African Americans were more divided on this question. The mean difference in responses to the forced choice question by racial group was statistically significant ( $\chi^2(1, N = 3269) = 83.43$ ,  $p < .001$ ). Interestingly, the results of the forced choice question were nearly identical to those of Study 1; Whites in the pilot study were strongly in favor of the idea that GTC will improve people's overall medical care, with a majority of White respondents (76%) selecting this option in Study 1. Similar to Study 2, African Americans in the pilot study were more divided on this question, as 54% believed the GTC will improve people's overall medical care and 46% were more concerned that GTC will discriminate against people that are less responsive to treatment.

Table 6.5.

*Distribution (%) of Baseline Opinions about Genetically Targeted Care*

Baseline Measure (Phase 1)	<u>African American</u> ( <i>n</i> = 734)	<u>White</u> ( <i>n</i> = 2535)	$\chi^2$ (1)
GTC will improve people's overall medical care.	54.8	72.5	83.43***
GTC will discriminate against people that are less responsive to treatment.	45.2	27.5	

\*\*\*  $p < .001$

## Hypothesis 2

Counter to Hypothesis 2 (H2), there were no statistically significant interaction effects of the experimental treatment and respondent race for Phase 2 attitudes toward GTC. Cueing race as the basis for GTC produced no interactions between the stimulus message and respondent race. ANOVA models were used to examine the main effects and interaction effects of the treatment condition and respondent race on the outcome variables in this study. Although each of the interaction terms was non-significant, the main effects of the treatment condition and/or respondent race were statistically significant in three of the ANOVA models.

Table 6.6 depicts the results of the ANOVA models for each outcome measure of favorability toward GTC. As shown on the table, the two-way model of favorability toward GTC as a good way to personalize medicine accounted for slightly less than 1% of the variance in the dependant variable ( $R^2 = .005$ ), and yielded a statistically significant main effect of the treatment condition such that average favorability toward

Good Way was lower among participants in the racial cue group ( $M = 3.44$ ,  $SD = 1.08$ ) than the non-racial cue group ( $M = 3.52$ ,  $SD = 1.07$ ). There was also a statistically significant main effect of respondent race for responses to Good Way; immediately following exposure to the stimulus messages, there was slightly more favorability toward GTC as a good way to personalize medicine among Whites ( $M = 3.52$ ,  $SD = .91$ ) than among African Americans ( $M = 3.44$ ,  $SD = .90$ ). The ANOVA models for Benefit and Get Test yielded no statistically significant results.

Table 6.6.

*Analysis of Variance Results for Main Effects and Interaction Effects of Treatment and Race on Favorability toward Genetically Targeted Care (Phase 2)*

Source of Variation	Good Way ^					Benefit					Get Test ^				
	<i>df</i>	<i>MS</i>	<i>B</i> ( <i>SE</i> )	<i>F</i>	$\eta_p^2$	<i>df</i>	<i>MS</i>	<i>B</i> ( <i>SE</i> )	<i>F</i>	$\eta_p^2$	<i>df</i>	<i>MS</i>	<i>B</i> ( <i>SE</i> )	<i>F</i>	$\eta_p^2$
Racial Cue <sup>1</sup>	1	3.29	.10 (.03)	4.18*	.00	1	.29	.02 (.03)	.35	.00	1	.11	-.03 (.03)	.14	.00
White <sup>2</sup>	1	3.34	.08 (.04)	4.23*	.00	1	.01	.00 (.04)	.02	.00	1	.41	.03 (.04)	.52	.00
Racial Cue x White <sup>3</sup>	1	.91	.08 (.07)	1.16	.00	1	.06	-.02 (.08)	.08	.00	1	.43	-.06 (.08)	.53	.00
Residual	3285	.79				3284	.83				3280	.80			
Total	3289					3288					3284				

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

^ The assumption of homogeneity of variances was not met for these models; thus, a more conservative alpha criterion was adopted ( $p < .025$ ).

1. Treatment condition coded as: Racial Cue (1), Non-Racial Cue (2)

2. Respondents' race coded as: African American (0), White (1)

3. Treatment condition by respondents' race

Note. All variables were centered to avoid multicollinearity.

Table 6.7 shows the results of the ANOVA models predicting participants' responses to each measure of concern about GTC. The two-way ANOVA model predicting concerns about GTC limiting access to medical treatment accounted for 1% of the variance in the dependant variable ( $R^2 = .01$ ), and yielded a statistically significant main effect of respondent race such that concerns about limitations on access to treatment were greater among African Americans ( $M = 3.48$ ,  $SD = 1.01$ ) than among Whites ( $M = 3.25$ ,  $SD = 1.01$ ). The ANOVA model predicting concerns that people will not trust GTC accounted for slightly less than 1% of the variance in the dependant variable ( $R^2 = .005$ ), and generated a statistically significant main effect of the treatment condition such that the average degree of concern about No Trust was greater among participants in the racial cue condition ( $M = 3.21$ ,  $SD = 1.04$ ) than those in the non-racial cue condition ( $M = 3.09$ ,  $SD = 1.03$ ). The model also revealed a statistically significant main effect of respondent race such that concerns about trust were slightly higher among African Americans ( $M = 3.19$ ,  $SD = .87$ ) than among Whites ( $M = 3.11$ ,  $SD = .86$ ).

Table 6.7.

*Analysis of Variance Results for Main Effects and Interaction Effects of Treatment and Race on Concerns about Genetically Targeted Care (Phase 2)*

Source of variation	Limit <sup>^</sup>					No Trust <sup>^</sup>				
	<i>Df</i>	<i>MS</i>	<i>B</i> ( <i>SE</i> )	<i>F</i>	$\eta_p^2$	<i>df</i>	<i>MS</i>	<i>B</i> ( <i>SE</i> )	<i>F</i>	$\eta_p^2$
Racial Cue <sup>1</sup>	1	.09	.04 (.04)	.09	.00	1	8.50	-.10 (.03)	11.14**	.01
White <sup>2</sup>	1	31.55	-.23 (.04)	31.83***	.01	1	3.08	-.07 (.04)	4.05*	.00
Racial Cue x White <sup>3</sup>	1	1.05	.09 (.08)	1.06	.00	1	1.18	.09 (.07)	1.56	.00
Residual	3284	.99				3280	.76			
Total	3288					3284				

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

<sup>^</sup> The assumption of homogeneity of variances was not met for these models; thus, a more conservative alpha criterion was adopted ( $p < .025$ ).

1. Treatment condition coded as: Racial Cue (1), Non-Racial Cue (2)
2. Respondents' race coded as: African American (0), White (1)
3. Treatment condition by respondents' race

Note. All variables were centered to avoid multicollinearity.



### ***Research Questions***

Next, the three research questions were examined; the questions asked whether the effects of the stimulus messages on audiences' opinions about personalized medicine were moderated by *political ideology* (RQ1), *education* (RQ2), and *racial attitudes* (RQ3). Table 6.8 shows the intercorrelations among political ideology, education, racial attitudes, and the five outcome measures. These variables were significantly correlated with each other, but the magnitude of the relationships was not large. Political ideology and education were marginally correlated with some of the dependent variables in this study; although these observed associations were statistically significant, the size of the relationships was small. The racial attitudes measure was not statistically significantly correlated with any of the dependant variables. The five outcome measures were highly inter-correlated in the expected directions, and all of the associations were statistically significant. No other individual difference characteristics (e.g., income, age, religion, religious service attendance, religiosity, knowledge about genetics, need for cognition, and health locus of control) were found to be strongly or moderately correlated with the outcome measures.

Table 6.8.

*Zero-Order Correlations among Political Ideology, Education, Racial Attitudes, and Outcome Measures*

	1.	2.	3.	4.	5.	6.	7.	8.
1. Political Ideology	-							
2. Education	.05**	-						
3. Racial Attitudes	-.10***	-.06**	-					
4. Good Way	.05**	.06***	.01	-				
5. Limit	.04*	-.03	-.01	-.21***	-			
6. Benefit	.05**	.02	.03	.55***	-.22***	-		
7. No Trust	.02	-.03	-.02	-.25***	.34***	-.24***	-	
8. Get Test	.08***	.01	.02	.58***	-.19***	.54***	-.20***	-

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Note.  $N = 2585 - 3732$

Note. Political ideology was coded as 'strongly Conservative' (1) to 'strongly Liberal' (7). Education was coded in number of years of education. Racial attitudes was coded as a scale measure from 'strongly out-group favorable' (-100) to 'strongly in-group favorable' (100).

## Research Question 1

Research Question 1 (RQ1) asked whether the effects of the stimulus messages on opinions about personalized medicine were moderated by political ideology. ANOVA models were run predicting each outcome variable by treatment condition, respondent race, political ideology (coded as Liberal, Moderate, Conservative), and the two-way interaction between treatment condition and ideology, and the three-way interaction among treatment condition, respondent race, and ideology.

Results showed that political ideology did not moderate the effects of the treatment condition on participants' opinions about GTC. In contrast to the pilot study, there was no evidence that political ideology interacted with the experimental treatment to condition participants' opinions about GTC. There were no statistically significant two-way or three-way interaction effects involving ideology for participants' responses to the outcome measures. However, the results revealed a statistically significant *main* effect of political ideology for the three favorability outcome measures: Good Way ( $F(2, 3271) = 2.99, p \leq .05$ ), Benefit ( $F(2, 3270) = 7.01, p < .01$ ), and Get Test ( $F(2, 3266) = 5.57, p < .01$ ). As might be expected from the literature and in keeping with the pilot study results, Liberals tended to be more supportive of GTC and genetic testing for medical purposes than Conservatives and Moderates. On average, Liberals more strongly agreed that GTC is a good way to personalize medicine, that GTC would benefit people like them, and that it is a good idea to get a genetic test to find out how well a person will respond to medical treatment (refer to Table 6.9).<sup>8</sup>

---

<sup>8</sup> The main effects of political ideology on favorability toward Good Way, Benefit, and Get Test remained statistically significant after controlling for education and racial attitudes.

Table 6.9.

*Mean Responses to Good Way, Benefit, and Get Test by Political Ideology (Phase 2)*

Political Ideology	<u>Good Way</u>		<u>Benefit</u>		<u>Get Test</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Conservative	3.41	1.77	3.07	1.81	3.30	1.78
Moderate	3.44	1.16	3.20	1.19	3.39	1.17
Liberal	3.53	.92	3.29	.96	3.49	.92

## Research Question 2

Research Question 2 (RQ2) addressed whether the effects of the stimulus messages on audiences' opinions about personalized medicine were moderated by education. ANOVA models were run predicting each outcome variable by the treatment condition, respondent race, education level (coded in years), and the two-way interaction between treatment condition and education, and the three-way interaction among treatment condition, respondent race, and education.

Education moderated the effects of the treatment condition on favorability toward GTC as a good way to personalize medicine and concerns about GTC limiting access to medical treatment. The results revealed a statistically significant interaction effect of education by treatment group for favorability toward GTC as a good way to personalize medicine ( $F(5, 3289) = 2.66, p < .05$ ).<sup>9</sup> Figure 6.1 depicts the moderating effect of education by treatment condition for participants' favorability toward GTC as a good way to personalize medicine. In the non-racial cue group, education appeared to have a

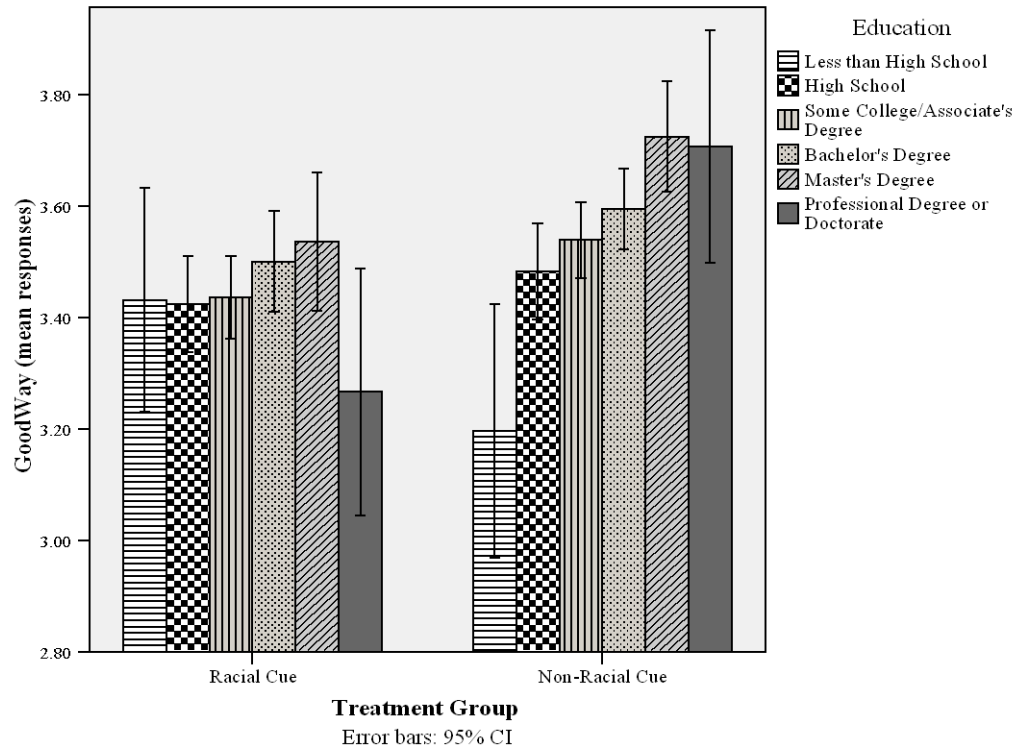
<sup>9</sup> The results of the ANOVA model were compared against a regression model to assess the moderating effects of education (coded as a continuous variable); the results were consistent across both sets of analyses. In addition, the two-way interaction effect of education by treatment condition for favorability toward Good Way remained statistically significant after controlling for political ideology and racial attitudes.

somewhat linear effect on favorability toward GTC, with higher levels of education associated with greater favorability toward GTC as a good way to personalize medicine. In the racial cue group, however, the effects of education were more complex; cueing race appeared to diminish participants' favorability toward GTC, particularly among respondents with higher levels of education. There was a statistically significant effect of education by treatment condition for participants' favorability toward GTC among those with a master's degree ( $t(412.45) = -2.33, p < .05$ ) and professional degree/doctorate ( $t(166) = -2.87, p < .01$ ). There was also a statistically significant effect of education by treatment for favorability among participants with some college or an Associate's degree ( $t(1198.64) = -2.02, p < .05$ ). More generally, there was a highly statistically significant effect of education by treatment group for responses to Good Way among participants with bachelor's degrees or higher ( $t(1438.66) = -3.51, p < .001$ ).

Presumably, higher educated people possess more complex heuristics about a range of topics including health and social issues, and the racial cue message may have heightened concerns about discrimination as a consequence of using race to provide personalized medicine; these concerns may have resulted in lower favorability toward GTC among more educated participants in the racial cue group, as compared to their counterparts in the non-racial cue group. There was also a statistically significant main effect of education for responses to Good Way ( $F(5, 3289) = 4.37, p < .001$ ), such that favorability toward GTC as a good way to personalize medicine was overall lowest among those with less than a high school education ( $M = 3.31, SD = .89$ ), and highest among participants with higher levels of education, particularly those with graduate degrees ( $M = 3.63, SD = .90$ ).

Figure 6.1.

Interaction Effect of Treatment Condition and Education for Beliefs that GTC is a Good Way to Personalize Medicine



The results also revealed a statistically significant three-way interaction effect of education level, treatment group, and respondent race for concerns that GTC will limit some people's access to medical treatment ( $F(11, 3288) = 2.23, p < .05$ ).<sup>10</sup> Figure 6.2 and Figure 6.3 depict the moderating effects of education by treatment condition for African Americans and Whites (respectively). Overall, African Americans were slightly more concerned about GTC limiting access to medical treatment than Whites. In the

<sup>10</sup> The three-way interaction effect of education by treatment group by respondent race for responses to Limit remained statistically significant after controlling for political ideology and racial attitudes. However, the interaction effect was not particularly robust: it was the only statistically significant three-way interaction effect observed and the effect was not statistically significant when education was treated as a continuous variable instead of a categorical variable.

racial cue group, increasing levels of education among African Americans translated into greater concern that GTC will limit people's access to medical treatment. The racial cue message led African Americans with higher levels of education to express the greatest degree of concern about GTC limiting access to medical treatment ( $M = 3.52$ ,  $SD = .06$ ). Within the racial cue group, there was a statistically significant effect of education by respondent race for participants with some college ( $t(640) = -4.92$ ,  $p < .001$ ) and those with a bachelor's degree or higher ( $t(3286) = -5.62$ ,  $p < .001$ ).

Concerns about discrimination in the delivery of medical care were likely more salient for African Americans than Whites, and the racial cue message appeared to heighten such concerns among African Americans. Among Whites, concerns about GTC limiting access to medical treatment were similar across experimental conditions; there were no statistically significant differences between treatment groups for Whites' responses to Limit. Taken together, the results of the three-way interaction effect involving education indicate that cueing race in the context of genetics and medicine heightened concerns about medical discrimination, particularly among highly educated African Americans. However, the three-way interaction effect involving education was not particularly robust, as there were no other statistically significant interaction effects involving education for the outcome variables in this study.

Figure 6.2.

Interaction Effect of Treatment Condition and Education for Concerns that GTC will Limit Access to Medical Treatment among African Americans

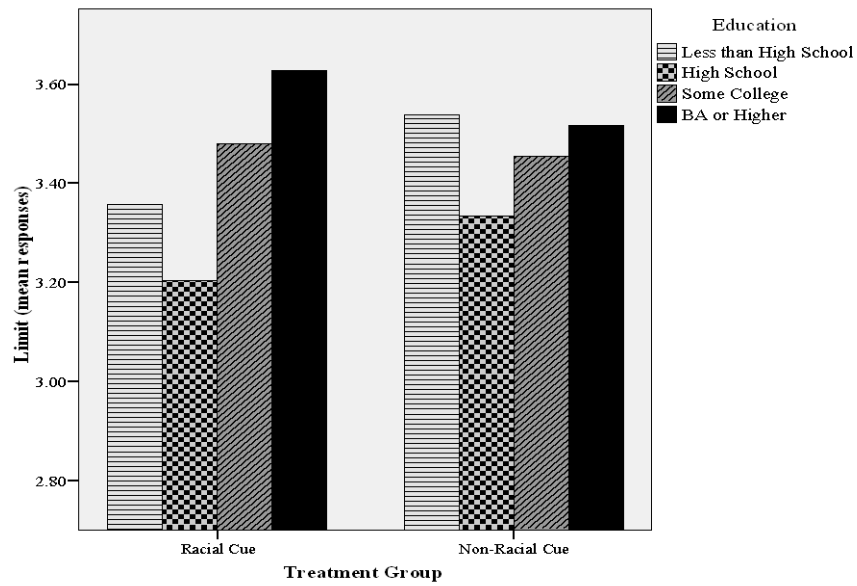
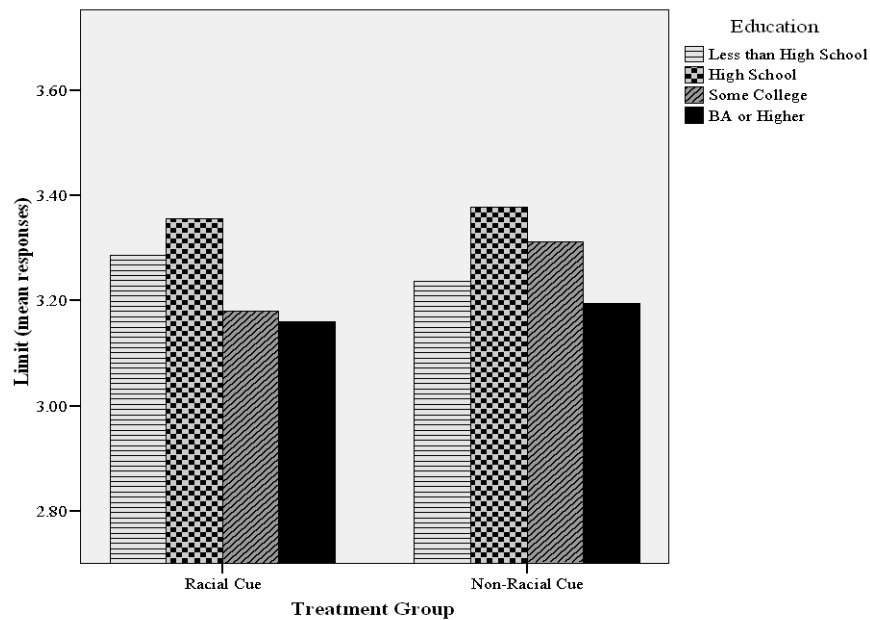


Figure 6.3.

Interaction Effect of Treatment Condition and Education for Concerns that GTC will Limit Access to Medical Treatment among Whites





### Research Question 3

Research Question 3 (RQ3) asked whether the effects of the stimulus messages on audiences' opinions about personalized medicine were moderated by racial attitudes.

ANCOVA models were run predicting each outcome variable by the treatment condition, respondent race, racial attitudes (coded categorically), the two-way interaction between treatment condition and racial attitudes, and the three-way interaction among treatment condition, respondent race, and racial attitudes; age was included as a covariate in these analyses to control for observed differences in participants' response rates to the racial attitudes measure by age.

At the outset, it was thought that the Benefit measure would be most likely to capture any differences by racial attitudes since the wording 'people like me' referenced one's in-group. The results did reveal a statistically significant interaction effect of racial attitudes by treatment condition for participants' favorability toward the idea that 'GTC would benefit people like me' ( $F(3, 2588) = 3.06, p < .05$ ).<sup>11</sup> Although the interaction effect was shown across both racial groups, further analyses indicated that the effect was not particularly robust; the only statistically significant difference between treatment groups occurred among participants that slightly favored their racial in-group. Among these participants, there was a statistically significant effect of the treatment condition for opinions about Benefit ( $t(915) = -2.11, p < .05$ ), such that there was greater favorability among those in the non-racial cue group ( $M = 3.30, SD = .85$ ) than the racial cue group ( $M = 3.18, SD = .91$ ). Table 6.8 depicts the mean responses to the Benefit question by

---

<sup>11</sup> The interaction effect of racial attitudes by treatment condition for responses to Benefit remained statistically significant after controlling for political ideology and education.

racial attitudes and treatment condition. There were no other statistically significant interaction effects of racial attitudes on participants' responses to the outcome variables.

Table 6.10.

*Mean Responses to GTC Would Benefit People like Me by Treatment Condition and Racial Attitudes (Phase 2)*

Racial Attitudes	<u>Racial Cue</u>			<u>Non-Racial Cue</u>		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Favor Out-Group	3.15	1.00	148	3.19	1.03	185
Neutral	3.27	1.12	523	3.24	1.13	577
Weakly Favor In-Group	3.14	1.06	446	3.31	1.02	475
Strongly Favor In-Group	3.33	1.02	145	3.08	1.05	113

### Post Hoc Analyses

Based on the compelling differences by education observed in this study, post hoc analyses were conducted to examine whether attention to news media about science and health (science news) moderated the effects of the stimulus messages on attitudes toward GTC. It is reasonable to expect that differences in education may have implications for attention to news about complex topics such as science and health. After all, people with higher levels of education are typically more likely to consume and comprehend news media coverage about science and health issues. Moreover, research has shown that exposure to science news is both consequential and ubiquitous. Studies reveal that the news media play a central role in the public's perceptions about science and health topics (Nisbet & Huge, 2006; Nisbet et al., 2002; Brodie et al., 2003), and more than half of the public reports that the news media are their most important source of health information (Brodie et al., 2003). To examine the potential moderating effects of attention to science

news, ANOVA models were run predicting each outcome variable by the treatment group, respondent race, science news, the two-way interaction between treatment group and science news, and the three-way interaction among treatment group, science news and respondent race. Corrections for experiment-wise error were performed using Tukey's test (i.e., reducing Type I error rates) (Field, 2005).

Results revealed that attention to science news moderated the effects of the treatment condition on audience's favorability toward and concern about GTC.<sup>12</sup> There was a statistically significant two-way interaction effect of science news by treatment condition for respondents' agreement with the idea that 'GTC would benefit people like me' ( $F(4, 3275) = 3.69, p < .01$ ). Figure 6.4 depicts the interaction effect of science news and treatment group on participants' favorability toward Benefit. Respondents that reported greater attention to science news tended to believe more strongly that GTC would benefit people like them, particularly in the presence of the racial cue stimulus message. In the racial cue group, there was a statistically significant effect of attention to science news ( $t(149.11) = -3.98, p < .001$ ), such that high science news consumers were in greatest agreement with the idea that GTC would benefit them ( $M = 3.61, SD = 1.17$ ), as compared to participants that reported less attention to science news ( $M = 3.21, SD = .89$ ). The results also revealed a statistically significant main effect of attention to science news for participants' beliefs about the benefits of GTC ( $F(4, 3275) = 11.11, p < .001$ ), such that support was lowest among non-consumers ( $M = 2.96, SD = 1.55$ ), and highest among those with a great deal of science news ( $M = 3.45, SD = 1.03$ ). In

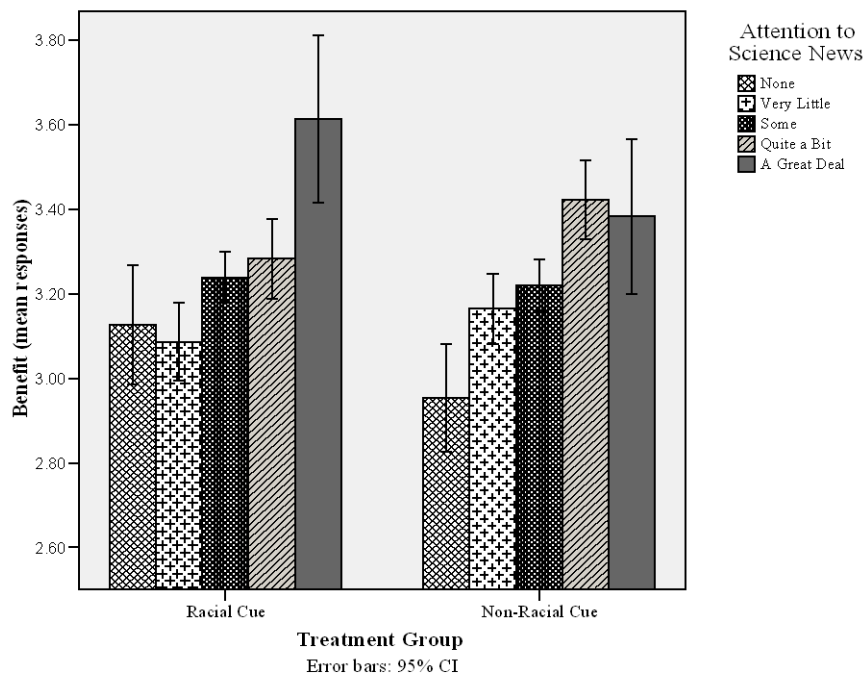
---

<sup>12</sup> The results of the ANOVA models involving science news were compared against the results of regression models; the effects of attention to science news were consistent across both sets of analyses.

addition, controlling for education did not change the results, as the main and interaction effects of attention to science news remained statistically significant after education level was controlled for.<sup>13</sup> Overall, the results indicate that cueing race as the basis for GTC increased perceptions among high science news consumers that GTC would benefit people like them; these participants' prior exposure to science news may have aided them in understanding how race might be used as a proxy for genetic similarity in the absence of genetic profiles. High science news consumers may have also believed that obtaining benefits from GTC requires a certain degree of knowledge about genetics and health in order to navigate this new form of medical care.

*Figure 6.4.*

Interaction Effect of Treatment Condition and Science News on Beliefs that GTC Would Benefit People like Me



<sup>13</sup> The correlation between education and science news was small, but statistically significant ( $a = .19, p < .001$ ).

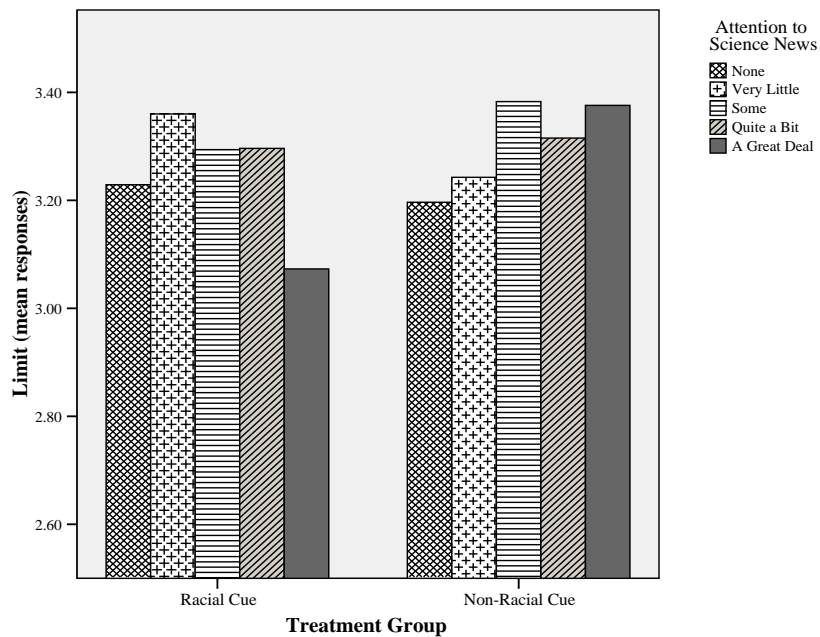
Post hoc analyses also revealed a statistically significant two-way interaction effect of attention to science news by treatment condition for audiences' concerns that GTC will limit people's access to medical treatment ( $F(4, 3275) = 2.79, p < .05$ ). Figure 6.5 depicts the moderating role of science news by treatment group for participants' responses to Limit. Interestingly, high science news consumers were overall least concerned that using race to provide GTC would limit some people's access to medical treatment. For participants with a great deal of attention to science news, there was a statistically significant effect of the treatment condition ( $t(267.79) = -2.11, p < .05$ ), such that those in the racial cue group were significantly less concerned about limitations on access to treatment as a consequence of GTC ( $M = 3.07, SD = 1.28$ ) than those in the non-racial cue group ( $M = 3.38, SD = 1.11$ ). In the racial cue group, there was a statistically significant effect of attention to science news ( $t(148.85) = 2.04, p < .05$ ), such that concerns about limitations were lower among high science news consumers ( $M = 3.07, SD = 1.28$ ) and highest among those with less attention to science news ( $M = 3.30, SD = .96$ ). Once again, the interaction effect of attention to science news by treatment condition remained statistically significant after controlling for education as a covariate.

It is possible that high science news consumers had greater familiarity with these topics from their media habits and they were therefore less 'squeamish' about the use of race to provide GTC; after all, race is one of many factors commonly used by medical practitioners to make clinical decisions in diagnosing and treating patients (Lee, 2003). This is not to say that concerns about racial discrimination in medicine are unwarranted, but rather that the practice of doctors incorporating racial considerations in their medical

care is not unprecedented. Perhaps participants with greater attention to science news had a better understanding about the nuances of population-based medicine, and were less wary about linking genetics and race in medical practice. There were no other statistically significant interaction effects of attention to science news for participants' responses to the outcome variables.

*Figure 6.5.*

Interaction Effect of Treatment Condition and Science News on Concerns that GTC Will Limit Access to Medical Treatment



Post hoc analyses were also conducted to examine the effects of religion and religiosity on public attitudes toward genetics, race and personalized medicine. A growing body of literature has revealed that religiosity and religious faith influences the way that some people encounter, interpret, and assess information about genetics, health and medicine (Parrott, Silk, Krieger, Harris, & Condit, 2004; Koenig & Larson, 1998).

Studies have shown that religious and ideological value predispositions strongly impact public awareness of new developments in science and stem cell research (Nisbet, 2005). Research has also revealed that religion and religious faith may function as social and personal resources that have implications for health and health behavior (Benjamins & Brown, 2004; Koenig & Larson, 1998; Levin & Schiller, 1987). The literature suggests that religion and religious faith may provide a coping mechanism for people as they encounter medical adversities (Levin & Schiller, 1987) and new information about genetics and health (Parrott et al., 2004). Scholars suggest that religious people may be less likely than others to ascribe deterministic influence to genes and genomics, opting instead to leave life and health matters to God (Kerr, Cunningham-Burley, & Amos, 1998; Parrot et al., 2004). Higher levels of religious faith have also been found to be related to lower levels of scientific literacy (Miller, 1983). The literature therefore suggests that religion and religiosity may influence public understanding and attitudes toward genetics and personalized medicine in unique ways.

To examine the potential effects of religion and faith, ANOVA models were run predicting each outcome variable by treatment condition, respondent race, religion/evangelicalism/service attendance, and the two-way interaction between treatment condition and religion/evangelicalism/service attendance. Corrections for experiment-wise error were performed as appropriate using Tukey's test (i.e., reducing Type I error rates) (Field, 2005).

There were no statistically significant interaction effects of religion, evangelicalism, or religious service attendance, however, main effects of these variables

were observed. The results revealed a statistically significant main effect of religion for participants evaluation of GTC as a good way to personalize medicine ( $F(4, 3273) = 3.05, p < .05$ ), such that average favorability toward Good Way was overall lowest among Baptists ( $M = 3.41, SD = .89$ ) and highest among participants with no religious affiliation ( $M = 3.56, SD = .94$ ). There was also a statistically significant main effect of religion for concerns about trust ( $F(4, 3268) = 2.83, p < .05$ ), with Baptists on average reporting the greatest degree of concern about people not trusting GTC ( $M = 3.24, SD = .86$ ). Lastly, the results showed a statistically significant main effect of religion ( $F(4, 3268) = 2.56, p < .05$ ) and evangelicalism ( $F(1, 3258) = 7.34, p < .01$ ) for opinions about whether it is a good idea to get a genetic test to find out how well a person will respond to medical treatment; as might be expected, support for this type of genetic testing was on average lowest among Baptists ( $M = 3.35, SD = .89$ ) and Evangelical Christians ( $M = 3.35, SD = .91$ ).

Religious service attendance also had a statistically significant main effect on opinions about whether it is a good idea to get a genetic test to find out how well a person will respond to medical treatment ( $F(4, 2697) = 2.62, p < .05$ ); it follows that participants that attended religious services every week were on average least supportive of getting a genetic test ( $M = 3.33, SD = .91$ ), and those that did not attend services were overall most supportive of getting a genetic test for these purposes ( $M = 3.51, SD = .98$ ). There was also a borderline statistically significant main effect of religious service attendance for concerns about people not trusting GTC ( $F(4, 2694) = 2.06, p < .09$ ), such that participants that attended services once a week were on average most concerned



about trust issues ( $M = 3.22$ ,  $SD = .88$ ) and those with no religious identification were on average least concerned ( $M = 3.12$ ,  $SD = .93$ ). There were no other statistically significant main effects or interaction effects involving religion, evangelicalism, or religious service attendance.

## ***Conclusion***

This study provided evidence to suggest that racial cues in messages about genetics may lead to more unfavorable opinions about personalized medicine. Across racial groups, participants exposed to a racial cue stimulus message were substantially less favorable toward GTC and more concerned about issues of trust than participants that received a non-racial cue message. Yet, counter to expectations, respondent race did not moderate the effects of the racial cue stimulus message on participants' favorability toward personalized medicine. Similar to the pilot study, Whites at the outset were more favorable toward GTC than African Americans; however, in contrast to the pilot study, there was no evidence of a change in opinion among Whites following exposure to the racial cue stimulus message. Before and after exposure to the stimulus messages, Whites were more favorable toward personalized medicine than African Americans, regardless of treatment condition. The results therefore indicate that the message effects were somewhat limited. The absence of an interaction effect by treatment group and respondent race may be partially explained by the generalized nature of the racial cue; the results suggest that messages about genetics that contain a general race cue, denoting neither in-group nor out-group racial status, may have similar effects on audience's favorability toward personalized medicine regardless of racial identification.

Similar to the pilot study, this research demonstrated that African Americans were more wary about new developments in genetics and personalized medicine than Whites. African Americans had greater concerns than Whites about discrimination and limits on access to medical treatment as a consequence of personalized medicine. African Americans were generally more divided regarding the relative merits and harms associated with personalized medicine. The results may be influenced by the history and past experiences of minority racial groups with regard to medical discrimination and eugenics. Events such as the Tuskegee Syphilis Study, in which African American males were denied medical treatment and deceived by officials of the United States Public Health Service, may heighten African Americans' apprehensions about discrimination as a consequence of new developments in medicine. Concerns about the use of genetics as a new form of racial discrimination are certainly warranted, since "even today, beliefs in genetic variation among different 'races' are routinely used by racists as evidence in favor of discriminatory programs or against programs that ameliorate historical and structurally based discrimination" (Condit & Bates, 2005, p. 98).

With regard to the effects of the background variables, this study revealed differences in participants' responses to the stimulus messages by education, but not political ideology. Similar to the pilot study, Study 2 found an interaction effect of education by treatment condition for favorability toward GTC immediately following exposure to the stimulus message. In contrast to the pilot study, however, this study found that the effects of education were sometimes consistent across racial groups. With regard to favorability toward GTC as a good way to personalize medicine, participants

with higher levels of education were less favorable as a result of the racial cue message than their counterparts in the non-racial condition. The phenomenon existed across racial groups, and may be explained by the idea that more highly educated participants possessed more complex heuristics regarding medicine, genetics and race. For these participants, the racial cue message may have heightened concerns about racial discrimination as a consequence of using race to provide medical treatment.

Concerns about racial discrimination may have also influenced opinions about whether GTC will limit some people's access to medical treatment. Respondent race and education interacted with the experimental manipulations to moderate participants' degree of concern about GTC limiting access to medical treatment. Overall, African Americans were somewhat more worried than Whites about limitations to medical treatment, perhaps because concerns about discrimination were more salient among African Americans. The effect of the racial cue message was most pronounced among highly educated African Americans, whom expressed the greatest degree of concern about GTC limiting access to medical care; these participants may have been highly attuned to issues of racial discrimination in medicine and eugenics, and the racial cue message may have heightened such apprehensions.

In addition, the study provided some evidence to suggest that racial attitudes moderated the effect of the treatment condition on participants' opinions about whether personalized medicine would benefit people like them. Interestingly, the Benefit question was the only outcome measure that tapped intergroup attributions by asking whether GTC would benefit 'people like me.' It was therefore not surprising that this

question revealed a significant difference in opinion by racial attitudes. For participants that somewhat favored their racial in-group, a racial cue led to lower support for the idea that GTC would benefit people like them. It is possible that the racial cue message led participants in this group to have greater concerns about personalized medicine, thereby reducing their agreement with Benefit. However, the interaction effect of racial attitudes was not robust, as the only statistically significant difference between conditions occurred among participants that slightly favored their racial in-group, and there were no other statistically significant interaction effects involving racial attitudes.

Post hoc analyses showed that attention to news media about science and health moderated the effects of the stimulus messages on attitudes toward GTC. Attention to science news interacted with the treatment condition to influence the perceived benefits and concerns that participants associated with GTC. Cueing race in the context of GTC had particularly interesting effects for participants with high levels of attention to science news; these respondents were on average in greater agreement that GTC would benefit people like them and they were less concerned about GTC limiting access to medical treatment. It is possible that these participants were more familiar with issues surrounding genetics, race, and medicine, and therefore they were less inclined to react negatively to the introduction of race in discussions about health and medicine. Most likely, these participants also had the greatest degree of interest in and understanding about these complex scientific and medical issues. However, it remains to be seen how different types of news media coverage influence people's opinions about developments in personalized medicine and genetics. Study 3 will address this issue by analyzing the

comparative effects of four different news frames on public attitudes and policy opinions regarding genetics, race and personalized medicine.

Post hoc analyses also revealed that religious identification and religious service attendance influenced people's attitudes toward genetics and medicine, but religion did not moderate the effects of the experimental treatment. As might be expected, religious people were least supportive of genetic testing to provide personalized medical treatment, and they were more concerned about people not trusting GTC. Participants with less fervent religious views tended to be more supportive of genetics research and genetic testing to provide medical treatment.

As with any research, this study has some weaknesses and limitations that are worth noting. For one, many of the findings were relatively small. However, since the experimental treatment was minimal and brief, the statistically significant differences in opinion across groups are still noteworthy. Also, as a new area of research inquiry, effect sizes are generally expected to be small (Cohen, 1988). Furthermore, since genetics and personalized medicine are burgeoning and complex topics, these somewhat small differences may translate into larger differences in public opinion as citizens gain greater familiarity with the subject matter. The observed variations in beliefs and attitudes may also translate into differences in related health or science policy preferences, but more research is needed to test this claim. In addition, given the complex nature of this research area, the experimental treatment may merit further consideration. It is possible that the stimulus messages did not provide adequate detail or information about the relationship among genetics, race, and personalized medicine.

Overall, however, this research contributes to a growing body of empirical work revealing that public attitudes about genetics and race are complex. The study provided evidence to suggest that racial cues in messages about genetics and personalized medicine can influence public opinion. This research showed that people preferred messages about personalized medicine that were individualized rather than ‘racialized.’ The results also indicated that message content and racial cues may interact with background variables to influence citizens’ opinions about personalized medicine. More generally, this study showed that messages about genetics and race can have implications for people’s beliefs and attitudes regarding medicine and health.

Scholarship in this area is valuable and timely because studies have shown that most of the U.S. public is still at the early stages of forming beliefs and attitudes about genomics and the media are largely influential in citizens’ awareness and understanding of genetics (Smith, 2007). The results of this research suggest that media messages about modern medical advances related to genetics and race may raise issues of trust and acceptance among members of minority racial and ethnic groups. Certainly, greater consideration should be given to the ways that new scientific discoveries related to genetics are communicated to audiences. Tailoring and targeting messages to specific racial and ethnic groups may prove effective in addressing the public’s different underlying beliefs and concerns regarding genetics, health and medicine. Yet, more empirical research is needed to understand how intergroup attributions and message framing may impact public opinion and policy preferences regarding genetics and personalized medicine.

## CHAPTER SEVEN: STUDY 3 METHODS

### *Overview*

Study 3 was designed to build on prior research by examining the effects of racial cues and message attributions on audiences' opinions about personalized medicine and health/science policy preferences. Study 1 and Study 2 provided evidence to suggest that racial cues in messages about genetics and health impact public opinion about personalized medicine, but the studies did not examine the role of controllability attributions and *intergroup* racial cues. Study 3 built on the earlier studies by examining the effects of controllability attributions and intergroup racial cues in health messages on audiences' opinions about personalized medicine, causal attributions for disease, and health policy preferences. The stimulus messages developed for this study were based on actual news articles and press release reports on new developments in personalized medicine and medical treatments for specific racial/ethnic groups. The fictitious heart disease drug described in the experimental stimulus messages was modeled after existing drugs, such as BiDil, that have been developed and marketed as race-specific medical drugs; these medical treatments were formulated for certain racial groups due to genetic traits that are commonly found within some racial groups but not across more racially diverse populations.

This study employed a between-subjects factorial design to test the impact of message controllability attributions and intergroup racial cues on opinions about personalized medicine and race-targeted medical treatments, causal attributions for heart

disease, and health/science policy preferences. Similar to Study 2, Study 3 was an experiment embedded in a large-scale survey developed by the Annenberg research group on Public Opinion, Deliberation and Decision Making about Genetics Research (gPOD). The experimental design was a 2 (controllability attribution: uncontrollable vs. controllable) by 2 (racial cue: African American vs. White) by 2 (respondent race: African American vs. White) between-subjects factorial design. Whereas controllability attributions and racial cues were manipulated in the stimulus messages, race of respondents was a personal characteristic that determined whether participants received either an in-group racial cue or an out-group racial cue. The study examined whether: a) racial in-group versus racial out-group status impacted respondents' causal attributions about heart disease, opinions about personalized medicine and policy preferences; b) causal attributions may be altered through controllability attribution framing in a press release article about heart disease and personalized medicine; and c) the effects of the message manipulations led to differences in public opinion about genetics and personalized medicine, as well as related health/science policies.

### *Hypotheses and Research Questions*

The first set of hypotheses for Study 3 concerned the main effects of controllability attributions in media messages on audiences' causal attributions for heart disease, opinions about personalized medicine and health/science policy preferences. Based on the attribution framework (Weiner, 1976, 2006), the uncontrollable attribution message was expected to guide more external attributions, whereas the controllable attribution message was expected to guide more internal attributions. Following



Weiner's attribution model (1974, 2006), it was hypothesized that policy opinions of support would be increased by uncontrollable attributions, rather than controllable attributions. Based on Lowi's (1964) policy typology, the distributive (also known as supportive) policy measures were designed to capture respondents' favorability toward personalized medicine and their interest in promoting advances in personalized medicine through new medical treatments and research. The regulatory policy items were designed to measure participants' interest in limiting the scope of personalized medicine and increasing government regulation of medical research and treatments related to personalized medicine and genetics.

*Hypothesis 1a (H1a):* Compared to the controllable attribution message, the uncontrollable attribution message will lead audiences to form more positive opinions about distributive policies and more negative opinions about regulatory policies.

*Hypothesis 1b (H1b):* Compared to the controllable attribution message, the uncontrollable attribution message will lead audiences to make more external causal attributions and fewer internal causal attributions.

*Hypothesis 1c (H1c):* The relationship between message attributions and policy preferences will be partially mediated by causal attributions.

The second set of hypotheses concerned the main effects of intergroup racial cues on audiences' causal attributions for heart disease, opinions about personalized medicine and health/science policy preferences. Based on the ultimate attribution error (Pettigrew, 1979; Allison & Messick, 1985), it was expected that racial cues would affect audiences in a way that favored participants' racial in-group, regardless of the race of respondents.

In other words, participants were expected to make more external attributions (and less internal attributions) and form more positive opinions about personalized medicine and distributive policies (and less positive opinions about regulatory policies) when an in-group racial cue was present in the press release article.

*Hypothesis 2a (H2a):* Intergroup racial cue will influence policy preferences such that an in-group racial cue, as compared to an out-group racial cue, will increase audience's distributive policy preferences and decrease their regulatory policy preferences.

*Hypothesis 2b (H2b):* Intergroup racial cue will influence causal attributions such that an in-group racial cue, as compared to an out-group racial cue, will guide audiences to make more external causal attributions and fewer internal causal attributions.

*Hypothesis 2c (H2c):* Intergroup racial cue will influence opinions about personalized medicine such that an in-group racial cue, as compared to an out-group racial cue, will lead audiences' to have more favorable opinions about personalized medicine.

The third set of hypotheses concerned the interaction effects of intergroup racial cues and controllability attributions on public opinion and policy preferences; it was thought that distributive policy preferences and favorability toward personalized medicine and race-targeted medical treatment would be overall lowest among participants that received a controllable attribution and out-group racial cue message.

*Hypothesis 3a (H3a):* Intergroup racial cue will interact with controllability attribution to moderate the effects of the stimulus messages on policy preferences, such

that distributive policy preferences will be overall lowest among participants in the controllable attribution/out-group racial cue condition.

*Hypothesis 3b (H3b):* Intergroup racial cue will interact with controllability attribution to moderate the effects of the stimulus messages on opinions about personalized medicine, such that favorability toward personalized medicine will be overall lowest among participants in the controllable attribution/out-group racial cue condition.

*Hypothesis 3c (H3c):* Intergroup racial cue will interact with controllability attribution to moderate the effects of the stimulus messages on opinions about race-targeted medical care, such that favorability toward race-targeted medical care will be overall lowest among participants in the controllable attribution/out-group racial cue condition.

The fourth set of hypotheses pertained to the direct effects of audience's opinions about personalized medicine and race-targeted medical treatment on health/science policy preferences. Using Lowi's (1964) policy typology, it was expected that greater favorability toward personalized medicine and race-targeted medical care would increase distributive policy preferences and decrease regulatory policy preferences.

*Hypothesis 4a (H4a):* Favorable opinions about personalized medicine will increase distributive policy preferences and decrease regulatory policy preferences.

*Hypothesis 4b (H4b):* Favorable opinions about race-targeted medical treatment will increase distributive policy preferences and decrease regulatory policy preferences.

Two additional research questions examined the moderating role of education and racial attitudes on audiences' responses to the experimental message features. Based on the results of Study 1 and Study 2, it was thought that audiences' education level and racial attitudes would moderate the effects of message controllability attributions and intergroup racial cues on causal attributions about heart disease, opinions about personalized medicine, and health/science policy preferences.

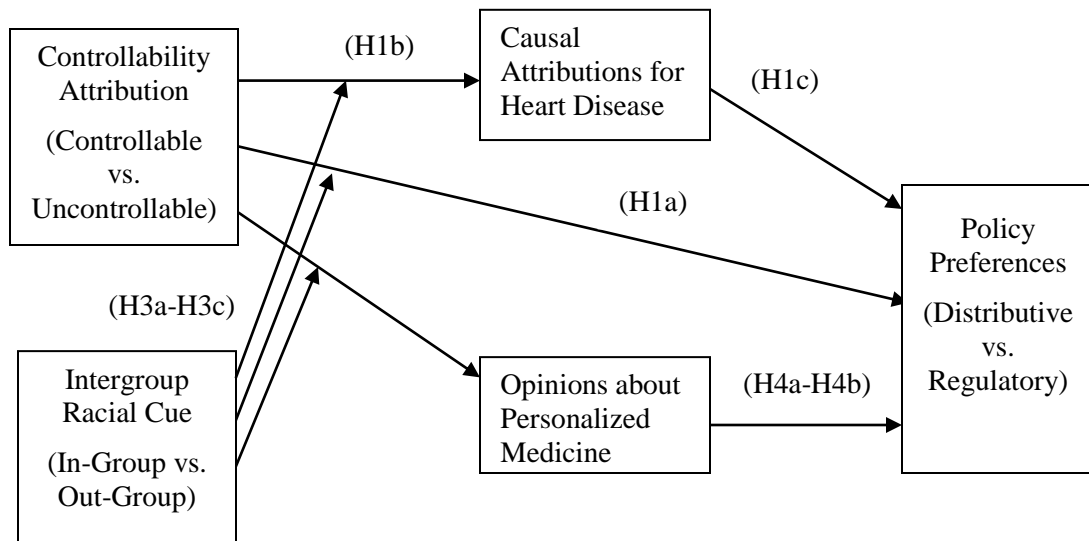
*Research Question 1:* Are the effects of the stimulus messages on causal attributions, opinions about personalized medicine, and policy preferences moderated by education?

*Research Question 2:* Are the effects of the stimulus messages on causal attributions, opinions about personalized medicine, and policy preferences moderated by racial attitudes?

Figure 7.1 and Figure 7.2 illustrate the predicted model effects for message controllability attributions and intergroup racial cues on audiences' causal attributions for heart disease, opinions about personalized medicine, and health policy preferences. The research hypotheses are indicated next to each of the relevant pathway in the models.

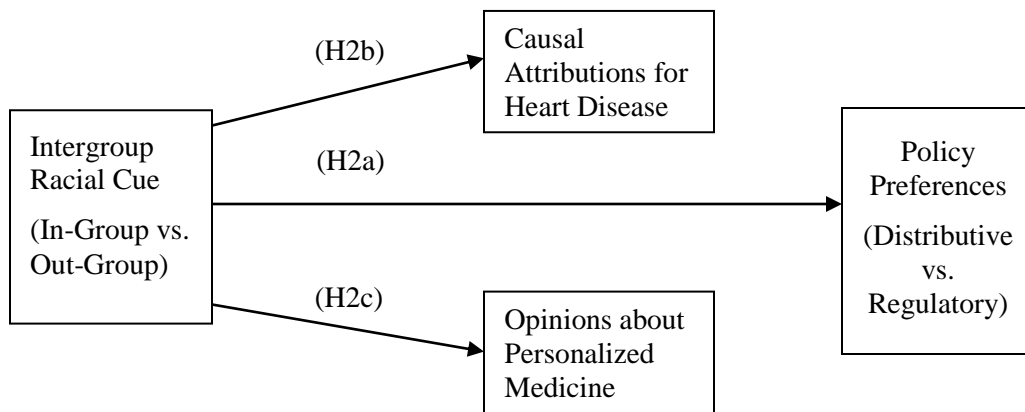
*Figure 7.1.*

A Model of the Predicted Main Effects of Controllability Attribution and Interaction Effects of Controllability Attribution and Intergroup Racial Cue on Audiences' Causal Attributions, Opinions about Personalized Medicine, and Policy Preferences.



*Figure 7.2.*

A Model of the Predicted Main Effects of Intergroup Racial Cue on Audiences' Causal Attributions, Opinions about Personalized Medicine, and Policy Preferences.



## ***Methods***

### *Design*

Study 3 was designed to examine the effects of message controllability attributions and intergroup racial cues on causal attributions for heart disease, opinions about personalized medicine and health/science policy preferences. The experimental design was a 2 (controllability attribution: uncontrollable vs. controllable) by 2 (racial cue: African American vs. White) by 2 (respondent race: African American vs. White) between-subjects factorial design.

Main effects as well as interaction effects of the experimental manipulations on outcome variables were tested using between-subjects factorial analysis of variance (ANOVA) and analysis of covariance (ANCOVA). A priori hypotheses were examined using planned contrasts. All hypotheses were tested using two-tailed statistical tests, but one-tail tests showing trends consistent with a priori hypotheses are presented. Research questions were tested using two-tailed statistical tests. Tests of mediational effects were conducted using Sobel's test of mediation. Demographics and other background variables were examined to ensure random distribution of participants across the experimental conditions. Any relevant background variables that failed to meet the requirements for random distribution were controlled for as covariates in ANCOVA models. The role of individual difference characteristics (e.g., education, racial attitudes) were examined using ANOVA and ANCOVA models to test for possible two-way and three-way interaction effects between the experimental manipulations and individual differences on the outcome measures.

### *Participants*

A nationally representative sample of American adults ( $N = 1,602$ ) participated in this study. Respondents in the gPOD project that were assigned to the online discussion groups and those assigned to the pre/post survey-only group were recruited to participate in Study 3, and the sampling procedures were conducted by Knowledge Networks (refer to Appendix F for a comparison of sample characteristics for Study 2 and Study 3). Study 3 was embedded as a module in the pre-discussion survey during Phase 2 of the gPOD project (see Appendix E for more detail on the gPOD project design). As described earlier, Knowledge Networks maintains a research panel that is representative of the U.S. population. The sample of participants for the gPOD project was recruited by Knowledge Networks using a probability sampling technique (random digit dialing; RDD).

The sample of participants for this study was generally well-educated, as about 44% had a bachelor's degree or higher, 30% had some college or an associate's degree and 26% had a high school education or less. The average age of respondents was about 46 ( $SD = 15.71$ ). In order to test hypotheses concerning racial priming, African Americans were oversampled and a total of 306 African Americans participated in this study. A total of 1,086 Non-Hispanic Whites, 120 Hispanics, and 90 participants identified as other races or biracial also participated in the study. This study focuses on comparisons of all non-Hispanic Whites and African Americans ( $N = 1,392$ ) in the sample; for the purposes of analysis, respondents that did not self-identify as either White or African American ( $N = 210$ ) were excluded from the sample.

## *Procedure*

This study was administered by Knowledge Networks during February of 2009. All participants completed Study 3 online (refer to Appendix D for the questionnaire). Participants in the study were able to read the stimulus materials and answer all of the questionnaire items online. For those respondents that did not have access to the internet, a Web TV appliance was provided with proper operating instructions. Participants were randomly assigned to one of four press release conditions: 1) uncontrollable attribution/African American racial cue; 2) uncontrollable attribution/White racial cue; 3) controllable attribution/African American racial cue; and 4) controllable attribution/White racial cue (refer to Appendix C for the stimulus messages). Approximately 25% of participants were randomly assigned to each experimental condition. The randomization to experimental conditions was performed by Knowledge Networks.

Prior to exposure to Study 3, all participants completed a panel survey from Knowledge Networks and the gPOD baseline questionnaire, which included measures of several background variables such as race, gender, age, education, income, political partisanship, political ideology, knowledge about genetics, and racial attitudes.<sup>14</sup> After random assignment to the stimulus message condition, all participants in Study 3 were

---

<sup>14</sup> Racial attitudes were measured in the baseline questionnaire from October 29<sup>th</sup> to November 17<sup>th</sup>, 2008. However, due to a technical error in the administration of the questionnaire, a random split sample of participants did not receive the racial attitude measures at baseline; these participants received the questions in a follow-up survey fielded from December 15, 2008 to January 15, 2009. Consequently, there was a substantial portion of missing values (17.5% missing for each measure and for the combined racial attitudes measure). Responders and non-responders were compared at baseline and follow-up; age was the only background variable significantly associated with participation, and therefore age was included as a covariate in all analyses involving racial attitudes.



asked to complete a survey questionnaire; the questionnaire included measures of health/science policy preferences, causal attributions about heart disease, and opinions about personalized medicine and race-targeted medical care.

### *Pre-Test*

The stimulus messages, causal attribution measures, and policy measures were pre-tested in order to conduct manipulation checks. The pre-test study was conducted online using *SurveyGizmo.com*, a web survey tool. A convenience sample of participants was recruited for the pre-test and respondents were randomly assigned to one of four online press release articles. Following exposure to the stimulus message, all participants received an identical survey questionnaire that included factual recall items about the messages as well as measures of causal attributions for heart disease and health policy opinions. The pre-test showed that the survey measures captured differences in respondents' causal attributions for heart disease and health policy preferences, based on randomized assignment to the stimulus message conditions.

Measures of specific and general causal explanations for heart disease produced mean response differences by group that were in the anticipated directions. The specific causal attribution items showed that participants expressed more *external* causal attributions following exposure to the uncontrollable attribution message ( $M = 3.50$ ,  $SD = .58$ ) as compared to the controllable attribution message ( $M = 3.10$ ,  $SD = .74$ ). Respondents also tended to make fewer *internal* causal attributions after receiving the uncontrollable message ( $M = 3.26$ ,  $SD = .52$ ) as compared to the controllable message ( $M = 3.51$ ,  $SD = .54$ ). Mean responses to the *general* causal attribution items were also in

the expected directions. Participants expressed greater support for the general *external* causal attribution items following exposure to the uncontrollable message ( $M = 3.02$ ,  $SD = .68$ ) as compared to the controllable message ( $M = 2.83$ ,  $SD = .54$ ). Respondents also tended to make fewer general *internal* causal attributions (general) in the uncontrollable attribution group ( $M = 3.40$ ,  $SD = .76$ ) as compared to the controllable attribution group ( $M = 3.76$ ,  $SD = .72$ ).

The message manipulations also appeared to influence participants' opinions about the distributive and regulatory policies. Participants had greater distributive policy preferences following exposure to the uncontrollable attribution message ( $M = 3.39$ ,  $SD = .77$ ) as compared to the controllable attribution message ( $M = 3.27$ ,  $SD = .88$ ). In addition, an in-group racial cue led to greater distributive policy preferences ( $M = 3.47$ ,  $SD = .74$ ) than an out-group cue ( $M = 3.19$ ,  $SD = .87$ ). Mean responses to the regulatory policy measures were also in the expected directions. Participants were less supportive of the regulatory policies following exposure to the uncontrollable attribution message ( $M = 2.53$ ,  $SD = .72$ ) as compared to the controllable message ( $M = 2.67$ ,  $SD = .59$ ). Moreover, an in-group racial cue led to less support for the regulatory policies ( $M = 2.41$ ,  $SD = .64$ ) as compared to an out-group cue ( $M = 2.79$ ,  $SD = .65$ ).

Participants were also given the opportunity to provide any feedback on the study in an open-ended response section at the end of the pre-test survey. The qualitative information collected from the open-ended questions was used to improve the clarity of the stimulus messages by adding greater detail about the meaning of key terms or phrases, such as personalized medicine.

## ***Stimulus Messages***

The stimulus messages were designed based on published news articles and press releases. Two aspects of the messages were manipulated to test their effects: controllability attribution (uncontrollable vs. controllable) and racial cue (African American vs. White). Four versions of the press release article were created, one per experimental condition (refer to Appendix C). The titles of the articles reinforced the central claim of each message: 1) “New Personalized Medicine Treatment Helps African Americans with Genetic Risks for Heart Disease;” 2) “New Personalized Medicine Treatment Helps Caucasians with Genetic Risks for Heart Disease;” 3) “New Personalized Medicine Treatment Helps African Americans with Behavioral Risks for Heart Disease;” and 4) “New Personalized Medicine Treatment Helps Caucasians with Behavioral Risks for Heart Disease.” In order to increase ecological validity, the majority of the information in the stimulus articles was based on actual press releases and medical reports, particularly the news article “Unblame the Victim: Heart Disease Causes Vary” (*The New York Times*, 9/11/2004).

Heart disease was chosen as the topic of the stimulus messages for several reasons. Firstly, heart disease is a leading cause of death and morbidity in the U.S., brought on by hereditary factors and genetics as well as poor diet and lack of exercise (French et al., 2000). Studies have revealed that the public attributes several different causes for heart disease, including controllable and uncontrollable causal factors (French et al., 2001). In addition, research has shown that there are disparities in national rates of heart disease by race/ethnicity (Cooper, Cutler, & Desvigne-Nickens, et al., 2000) and

personalized medicine has begun to play an important role in medical advances and research on the treatment and prevention of heart disease (Mensah, 2005; Turner et al., 2007). Race is often used as a proxy, albeit imprecise, for genetic differences in clinical and pharmacological studies of heart disease, such as the African American Heart Failure Trial (A-HeFT); this confirmatory trial, completed in July of 2004, was conducted to gain FDA approval of BiDil, a heart disease drug that received the first race-specific patent for use among African Americans (Sankar & Kahn, 2005). Research has shown that a common theme in news media coverage of BiDil was the use of race as a proxy for genotype (Caulfield & Harry, 2008). More generally, studies have shown that heart disease, including new medical treatments and prevention methods, attracts widespread media coverage (Brodie et al., 2003; Lupton & Chapman, 1995).

In order to ensure comparability across the four stimulus message conditions, the core information was kept the same for each press release article. The article lead described the discovery of a new medical drug found to reduce the risk of heart disease. The identical core information described the role of personalized medicine, genetics and race in the prevention and treatment of disease. The controllability attribution was manipulated in a way to minimize variation in semantic cues across the experimental conditions. Both types of risk factors for heart disease (uncontrollable and controllable) were mentioned in each of the press release messages, however, the emphasis placed on one factor relative to the other varied across conditions. Moreover, two of the articles reported that African Americans received benefits from the drug, and the other two

reported that Whites received the medical benefits. The full messages are presented in a paragraph-by-paragraph comparison in Appendix C.

With regard to the controllability dimension, the uncontrollable attribution article framed heart disease risk as predominantly determined by genetics and hereditary factors (e.g., a genetic predisposition for heart disease) to guide external causal attributions, whereas the controllable attribution article framed heart disease risk as predominantly determined by behavioral choices (e.g., poor diet and lack of exercise) to elicit internal causal attributions. For example, the uncontrollable attribution message highlighted the role of genetics as a determinant of heart disease and concluded that a person's chances of getting heart disease are "very much dominated by family genetics." In contrast, the controllable attribution message underscored the role of poor diet and lack of exercise, stating that a person's chances of getting heart disease are "very much dominated by eating habits and fitness level." These causal claims were selected because they are highlighted in the literature and mainstream press as central factors contributing to heart disease (Sankofa & Johnson-Taylor, 2007; Adelman & Verbrugge, 2000; Finnegan, Viswanath, & Hertog, 1999; Lupton & Chapman, 1995; French et al., 2000, 2001).

The fictitious drug, called Paxon, was based on reports of existing medical drugs, such as BiDil, that have been developed and marketed to treat heart disease among specific racial groups. The description of Paxon was identical across all four experimental conditions, with the exception of the racial group (African American or White) that was reported to have benefited from the medical drug. The term 'Caucasian' was used instead of 'White' because an informal content analysis showed that most news

articles and press releases employed the more technical term ‘Caucasian’ in their medical reporting. The racial cue manipulation was included in the study because a) disparities in the effectiveness of heart disease drugs have been found across racial groups and these differences have been reported by the media, and b) variations in people’s in-group versus out-group racial status may influence audiences’ causal attributions for heart disease and opinions about personalized medicine, as well as related health policy preferences. African Americans and Whites were randomly assigned to either a condition cueing their own race or cueing a different race as the beneficiary of the heart disease drug. Accordingly, the effects of cueing in-group versus out-group racial status in the context of heart disease and personalized medicine were examined for both racial groups.

### ***Measures***

The study questionnaire was structured in the following order: health/science policy preferences, causal attributions about heart disease, opinions about personalized medicine, opinions about race-targeted medical care, agreement with the stimulus message, and message recall. Since the experiment was embedded in a large-scale survey during Phase 2 of the gPOD project (refer to Appendix E), all participants provided demographic and other background information prior to exposure to the Study 3 stimulus messages.

#### ***Pre-Message Measures***

The pre-message measures were identical to those in Study 2. Background information relevant to the present study included demographic and socioeconomic

variables (e.g., race, gender, education, age, income), as well as political partisanship, political ideology, racial attitudes, attention to news media about health and science, and knowledge about genetics.

*Political Partisanship and Political Ideology.* Political partisanship was measured in the gPOD baseline questionnaire using a survey item that read: “Generally speaking, do you consider yourself...” (1 = strong Republican to 7 = strong Democrat). Political ideology was measured by a question that asked: “In general, do you consider yourself as...” (1 = extremely Conservative to 7 = extremely Liberal).

About 50% of all Whites and African Americans in the study were some type of Democrat (coded as 5 to 7), 30% were some type of Republican (coded as 1 to 3), and approximately 20% were Independent (coded as 4). Among Whites, 40% were Democrats, 38% were Republicans, and 22% were Independents. Approximately 84% of African Americans were Democrats, 5% were Republicans, and 11% were Independents. With regard to political ideology, about 49% of the total sample of Whites and African Americans considered themselves Liberal (coded as 5 to 7), 31% were Conservative (coded as 1 to 3), and about 20% were Moderate (coded as 4). Among Whites, about 39% were Liberals, 38% were Conservatives, and 23% were Moderates. Among African Americans, 79% were Liberals, 8% were Conservatives, and 13% were Moderates.

*Education* was coded in number of years of education (10 = less than a high school education, 12 = high school graduate, 14 = some college/associate’s degree, 16 = bachelor’s degree, 18 = master’s degree, 21 = doctorate or professional degree).

Approximately 4% of the sample had less than a high school education, 22% were high

school graduates, 30% had some college or an associate's degree, 27% had a bachelor's degree, 12% had a master's degree, and 5% had a doctorate or professional degree.<sup>15</sup>

African Americans and Whites were fairly comparable in the distribution of education across participants, with the exception that Whites had a higher percentage of high school graduates (26%, as compared to 15% among African Americans), and African Americans had a greater percentage of people with associate's degrees or some college (41%), as compared to Whites (31%).

*Racial Attitudes.* Racial attitudes toward African Americans and Whites were measured using feeling thermometers; the items read as follows: "For each of the following groups, please tell me if your opinion is favorable or unfavorable using a scale from 1 to 100. Zero means very unfavorable, and 100 means very favorable. 50 means you do not feel favorable or unfavorable." Participants were asked to rate their favorability using a slider bar that ranged from 0 to 100. The racial attitudes variable was computed from a combined measure of respondents' attitudes toward a racial out-group subtracted from their attitudes toward their racial in-group; the combined favorability measures could range from -100 to 100, in increments of 5.<sup>16</sup> For African Americans, the racial attitudes measure was derived from respondents' favorability toward Whites, subtracted from their favorability toward African Americans. For Whites, this measure

---

<sup>15</sup> Although participants with less than a high school education and those with a doctorate or professional degree constituted a minority of participants, analyses of other demographic variables indicated that they were substantively different from other groups and therefore they were coded as separate categories of education.

<sup>16</sup> The procedure of intergroup comparison followed Kam and Kinder's (2007) work on ethnocentrism, but the scale items measuring racial attitudes in this study were not the same as the scale items employed by Kam and Kinder.



was computed from participants' favorability toward African Americans, subtracted from their favorability toward Whites.

As in Study 2, the variance in the racial attitudes measure for Study 3 was not normally distributed, as almost 35% of the sample fell in the neutral range with a mean score of zero; although the question wording and the online nature of the survey were designed to minimize biases, the results of the racial attitude measure seemed to indicate that there was a social desirability bias. As a result of the variance and distribution of responses, the racial attitudes measure was coded categorically in the following four groups: favor out-group (1), neutral/egalitarian (2), weakly favor in-group (3), and strongly favor in-group (4). Participants that rated their racial out-group more highly than their in-group received a score of 1, those that rated both racial groups equally received a score of 2, those that rated their racial in-group slightly more highly than their out-group received a 3, and those that rated their racial in-group substantially higher than their racial out-group received a 4. Approximately 13% of participants were favorable toward their racial out-group (1), 42% were neutral/egalitarian, 36% were slightly more favorable toward their racial in-group, and about 9% were strongly favorable toward their racial in-group; Whites and African Americans were fairly evenly distributed across these groups, and there was no statistically significant difference in racial attitudes by respondent race ( $\chi^2(1, N = 1124) = 2.86, p = .41$ ).

*Knowledge about Genetics.* Participants' knowledge about genetics was measured by responses to a battery of true/false items. These knowledge items were included in the baseline survey during Phase 1 of the gPOD research project in order to avoid

confounding the results of this study with the measurement of background variables related to genetics. The knowledge items read as follows: 1) “The onset of certain diseases is due to genes, environment, and lifestyle” (True), 2) “A gene is a disease” (False), 3) “One can see a gene with the naked eye” (False), 4) “Healthy parents can have a child with a genetic disease” (True), 5) “A person may carry a gene for a disease and not have the disease” (True), 6) “A gene is a piece of DNA” (True), and 7) “Different body parts include different genes” (False). Responses to the seven knowledge items were coded as correct (1) or incorrect/skipped (0), and a summative scale measure of number of correct responses to the genetics knowledge items was created for the purposes of analysis.

#### *Post-Message Measures*

*Distributive Policy Preferences.* Based on Lowi’s (1964) policy typology, this study included several measures of opinions regarding distributive (or supportive) policies. Respondents were asked whether they supported or opposed each of the following distributive policy measures: 1) “Government funding to promote scientific research on personalized medicine (the development of medical drugs based on a person’s genetics)” ( $M = 3.65$ ,  $SD = 1.04$ ), 2) “Government funding for the development of medical drugs for specific racial groups” ( $M = 3.37$ ,  $SD = 1.14$ ), 3) “An increase in your taxes to provide government funding for public health campaigns to reduce heart disease among at-risk groups” ( $M = 2.99$ ,  $SD = 1.22$ ), 4) “An increase in your taxes to provide funding for scientific research on personalized medicine (the development of medical drugs based on a person’s genetics)” ( $M = 2.91$ ,  $SD = 1.20$ ), and 5) “An increase

in your taxes to provide funding for the development of medical drugs for specific racial groups” ( $M = 2.69$ ,  $SD = 1.19$ ). The response options for all of the distributive policy items ranged from ‘Strongly Oppose’ (1) to ‘Strongly Support’ (5).

Factor analysis was conducted on the distributive policy items to examine whether the measures tapped one underlying dimension, or concept. All five policy measures were subjected to a principle components factor analysis. The results showed that the distributive policy items loaded on one factor (Eigenvalue = 3.36, 67% of variance); the scale measure of distributive policy opinions showed high internal consistency ( $\alpha = .88$ ;  $M = 3.12$ ,  $SD = .95$ ).

*Regulatory Policy Preferences.* Respondents were also asked to indicate how much they supported or opposed each of the following regulatory (or discriminatory) policy measures: 1) “A policy requiring genetic testing of patients before they are prescribed Paxon so that doctors can determine if the drug is right for their genetic makeup” ( $M = 3.63$ ,  $SD = 1.04$ ), 2) “A policy requiring genetic testing for all patients to help doctors provide medical care that is tailored to each person’s genetic makeup” ( $M = 3.27$ ,  $SD = 1.21$ ), 3) “A policy requiring that health insurance companies provide coverage for genetic testing to screen for common diseases like heart disease” ( $M = 3.80$ ,  $SD = 1.13$ ), 4) “More government oversight of pharmaceutical companies that develop medical drugs for specific racial groups” ( $M = 3.37$ ,  $SD = 1.14$ ), and 5) “A policy allowing life insurance providers to adjust premiums based on whether or not people have risk factors for common diseases like heart disease” ( $M = 2.07$ ,  $SD = 1.11$ ).

Response options for all of the regulatory policy items ranged from ‘Strongly Oppose’ (1) to ‘Strongly Support’ (5).

Factor analysis was conducted on the regulatory policy items to examine whether the measures tapped one underlying dimension. All five policy measures were subjected to a principle components factor analysis. The results showed that the regulatory policy items loaded on one factor (Eigenvalue = 2.32, 46% of variance), but the five-item scale measure had moderate internal consistency ( $\alpha = .68$ ;  $M = 3.23$ ,  $SD = .74$ ). Reliability analyses showed that the fifth regulatory policy item, measuring opinions about allowing life insurance providers to adjust premiums, had the weakest association with the regulatory policy measures; this item was therefore removed from the scale measure and analyzed as a separate measure. The resulting four-item scale measure of regulatory policy opinions had good internal consistency ( $\alpha = .75$ ;  $M = 3.51$ ,  $SD = .85$ ).<sup>17</sup>

*Causal Attributions (Specific).* Respondents were provided with a list of specific causal attributions for heart disease and asked if they believed each one was: ‘Not at all Important’ (1), ‘Somewhat Important’ (2), ‘Very Important’ (3), or ‘Extremely Important’ (4). The list of causal factors included the following controllable and uncontrollable attributions: a) “Family History of Heart Disease,” b) “Bad Luck or Fate,”

---

<sup>17</sup> The ten policy measures were subjected to principal components factor analysis and reliability analysis. The results of the factor analysis showed that the ten policy measures loaded on two factors: distributive policy preferences (Eigenvalue = 5.99, 46% of variance) and regulatory policy preferences (Eigenvalue = 1.64, 13% of variance). Although the ten policy measures had high internal consistency ( $\alpha = .85$ ,  $M = 3.17$ ,  $SD = .75$ ), they were coded as separate measures of distributive and regulatory policy preferences based on a priori hypotheses, the results of the factor analysis, and their face validity as two groupings of policies that have been used by several other studies in prior research.

c) “Genetics,” d) “Behavioral Choices,” e) “Unhealthy Eating Habits,” and f) “Not Getting Enough Exercise.”

Factor analysis using principal components analysis followed by a direct oblimin rotation indicated that the six specific causal attribution items loaded on two factors: external causal attributions (Eigenvalue = 2.60, 43% of variance) and internal causal attributions (Eigenvalue = 1.30, 22% of variance).<sup>18</sup> The external causal factor included attributions to family history ( $M = 1.73$ ,  $SD = .72$ ), genetics ( $M = 2.03$ ,  $SD = .75$ ), and bad luck or fate ( $M = 3.62$ ,  $SD = .62$ ). The internal causal factor included attributions to eating habits ( $M = 3.42$ ,  $SD = .68$ ), exercise ( $M = 3.34$ ,  $SD = .70$ ), and behavioral choices ( $M = 3.18$ ,  $SD = .77$ ). The three external attribution items had low internal consistency ( $\alpha = .50$ ;  $M = 2.46$ ,  $SD = .49$ ); the ‘bad luck/fate’ item was weakly correlated with the other attribution items and the measure was dropped for the purposes of analysis. The attributions about genetics and family history were strongly correlated and a two-item scale measure of external causal attributions was created ( $r = .59$ ,  $p < .001$ ;  $M = 1.88$ ,  $SD = .65$ ). The three-item scale measure of internal causal attributions had high internal consistency ( $\alpha = .84$ ;  $M = 3.31$ ,  $SD = .62$ ).

*Causal Attributions (General).* In addition to the specific attribution items, general causal attributions for heart disease were also measured. Respondents were asked to indicate their agreement or disagreement with each of the following statements: 1) “Heart disease is the result of choices people make in their lives,” 2) “A person’s chances of getting heart disease are beyond their control,” 3) “People can avoid heart

---

<sup>18</sup> For the purposes of factor analysis and reliability analysis, the external causal items (specific) were reverse coded.

disease by maintaining a healthy lifestyle,” 4) “Heart disease is outside a person’s control,” 5) “People who get heart disease are responsible for their condition,” and 6) “If people take the right actions, they can prevent heart disease.” Responses to these items were coded on a five point scale from ‘Strongly Disagree’ (1) to ‘Strongly Agree’ (5).

Factor analysis using principal components analysis followed by a direct oblimin rotation indicated that the six general attribution items loaded on two factors: internal causal attributions (Eigenvalue = 2.67, 45% of variance) and external causal attributions (Eigenvalue = 1.19, 20% of variance).<sup>19</sup> The internal causal factor included attributions related to the choices people make in their lives ( $M = 3.35$ ,  $SD = .99$ ), maintaining a healthy lifestyle ( $M = 3.67$ ,  $SD = .88$ ), individual responsibility ( $M = 2.74$ ,  $SD = .98$ ), and taking the right actions to prevent heart disease ( $M = 3.46$ ,  $SD = .95$ ). The external causal factor included attributions that a person’s chances of getting heart disease are beyond their control ( $M = 3.36$ ,  $SD = .99$ ) and that heart disease is outside a person’s control ( $M = 3.45$ ,  $SD = .96$ ). The four-item scale measure of internal causal attributions had high internal consistency ( $\alpha = .74$ ;  $M = 3.31$ ,  $SD = .71$ ), and the two-item measure of external causal attributions had internal consistency ( $r = .55$ ,  $p < .001$ ;  $M = 3.40$ ,  $SD = .86$ ).

In addition, factor analysis using principal component analysis followed by a direct oblimin rotation indicated that the general causal attributions were distinct from the specific causal attributions. A factor analysis including all of the internal causal attribution measures (7 items in total) showed that the items loaded on two factors: 1) general causal attributions (Eigenvalue = 3.04, 43% of variance) and 2) specific causal

---

<sup>19</sup> For the purposes of factor analysis and reliability analysis, the external causal items (general) were reverse coded.

attributions (Eigenvalue = 1.50, 21% of variance). A factor analysis involving all of the external causal attribution measures (4 in total) also revealed that the measures loaded on two factors: 1) general causal attributions (Eigenvalue = 1.79, 45% of variance) and 2) specific causal attributions (Eigenvalue = 1.36, 34% of variance). With regard to the scale measures, there was a statistically significant correlation between the general and specific attribution measures of internal causal attributions ( $r = .34$ ,  $p < .001$ ) and external causal attributions ( $r = .14$ ,  $p < .001$ ); however, the magnitude of these relationships was not large and therefore the specific attributions and general attributions were analyzed separately, rather than forced into combined scale measures.

*Opinions about Personalized Medicine.* To measure opinions about personalized medicine, participants were asked how much they agreed or disagreed with each of the following: 1) “Personalized medicine will improve people’s overall medical care,” 2) “Personalized medicine will discriminate against people that are less responsive to medical treatment,” 3) “Personalized medicine will limit some people’s access to medical treatment,” 4) Personalized medicine will make no difference in people’s lives,” 5) “People like me would benefit from personalized medicine,” and 6) “People will not trust personalized medicine.” Responses to these items were coded on a five point scale from ‘Strongly Disagree’ (1) to ‘Strongly Agree’ (5).

Factor analysis using principal components analysis followed by a direct oblimin rotation indicated that the six measures of opinions about personalized medicine loaded on two factors: concerns about personalized medicine (Eigenvalue = 2.55, 42% of variance) and favorability toward personalized medicine (Eigenvalue = 1.05, 18% of

variance).<sup>20</sup> The concerns about personalized medicine factor included concerns about discrimination ( $M = 2.96$ ,  $SD = 1.00$ ), limitations on access to treatment ( $M = 2.65$ ,  $SD = 1.00$ ), and people not trusting personalized medicine ( $M = 3.02$ ,  $SD = .94$ ). Favorability toward personalized medicine included beliefs that personalized medicine will improve medical care ( $M = 3.65$ ,  $SD = .82$ ), make a difference in people's lives ( $M = 3.79$ ,  $SD = .81$ ), and benefit people like them ( $M = 3.33$ ,  $SD = .91$ ). The three concern items had moderate internal consistency ( $\alpha = .68$ ;  $M = 2.87$ ,  $SD = .77$ ), and the three favorability items also showed moderate internal consistency ( $r = .63$ ;  $M = 3.59$ ,  $SD = .65$ ).

Participants were also asked whether personalized medicine would “do more harm than good or more good than harm;” responses were coded as: ‘More Harm than Good’ (-2), ‘Somewhat More Harm than Good’ (-1), ‘Both Harm and Good Equally’ (0), ‘Somewhat More Good than Harm’ (1), and ‘Much More Good’ (2), the variable was analyzed separately as an overall measure of favorability toward personalized medicine.

*Opinions about Race-Targeted Medical Care.* To measure opinions about race-targeted medical care, participants were asked how much they agreed or disagreed with each of the following: 1) “Developing medical drugs for specific racial groups is a good way to fight disease,” and 2) “Race is a good way to personalize medical treatment.” Responses were coded on a five point scale from ‘Strongly Disagree’ (1) to ‘Strongly Agree’ (5). The measures were significantly correlated and reliable ( $r = .71$ ,  $p < .001$ ;  $M = 3.12$ ,  $SD = .95$ ). Participants were also asked whether “the development of medical

---

<sup>20</sup> For the purposes of factor analysis and reliability analysis, four of these items were reverse coded (questions #2, 3, 4, and 6) so that a higher score indicated more favorable opinions about personalized medicine for all six attitudinal measures.



drugs for specific racial groups will do more harm than good or more good than harm;” responses were coded as: ‘More Harm than Good’ (-2), ‘Somewhat More Harm than Good’ (-1), ‘Both Harm and Good Equally’ (0), ‘Somewhat More Good than Harm’ (1), and ‘Much More Good’ (2), and the variable was analyzed separately as an overall measure of favorability toward race-targeted medical care.

*Agreement with the Message.* Participants’ agreement with the content of the stimulus messages was measured and included as a manipulation check to ensure that there were no significant differences in message agreement across treatment conditions. Agreement with the stimulus messages was measured using the following items: 1) “How much do you agree or disagree with what the press release said about significant risk factors for heart disease in the United States?” and 2) “How much do you agree or disagree with what the press release said about the use of race to develop medical treatments for heart disease?” Responses to the two items were coded on a five point scale from ‘Strongly Disagree’ (1) to ‘Strongly Agree’ (5).

*Message Recall.* Three items were included in the questionnaire to verify participants’ recall of the information provided in the stimulus messages and to ensure that there were no significant differences in message recall across the four treatment conditions. Message recall was measured using three multiple-choice questions. The first question asked participants: “What is the name of the new heart disease drug described in the press release?” Response options were: a) ‘DiBil’, b) ‘Raston,’ c) ‘Novar,’ or d) ‘Paxon.’ The second recall item read: “According to the press release, the new heart disease drug is most effective for which racial group?” The response options

were: a) ‘African Americans,’ b) ‘Asians,’ c) ‘Hispanics,’ d) ‘Caucasians,’ or e) ‘No racial group was mentioned.’ The last question asked, “According to Dr. Gail Jones, the medical professor quoted at the end of the press release, which of the following are highly significant risk factors for heart disease in the United States?” The response options for the third question were: a) ‘Genetics and family history,’ b) ‘Diet and exercise,’ c) ‘Smoking cigarettes,’ or d) ‘All of the above.’

## ***Conclusion***

This chapter described the research methods for Study 3, including the experimental design, research hypotheses, study procedure, sample of participants, and measurement development. The empirical measures appeared to have sufficient quality to capture the effects of the experimental conditions on the outcome variables in Study 3. The outcome measures of policy preferences, causal attributions for heart disease, and opinions about personalized medicine and race-targeted medical care were scaled as appropriate, and the measures had high internal consistency and reliability. By employing a 2 x 2 x 2 experimental design involving a sample of over 1,300 participants, including an oversample of 306 African Americans, Study 3 maintained adequate statistical power to detect medium effect sizes, and potentially small effect sizes as well.<sup>21</sup> The following chapter presents the data results for Study 3.

---

<sup>21</sup> Assuming a two-tailed test at a .05 significance level and a power of 80%, a sample size of about 30 subjects per group was needed to detect medium-sized effects (.06), and 80-179 subjects per group was needed to detect small-sized effects (.02-.01, respectively) (Cohen, 1998; Keppel & Wickens, 2004).

## CHAPTER EIGHT: STUDY 3 RESULTS

### *Results*

This chapter analyzes the results of Study 3, and focuses on comparisons of all non-Hispanic Whites and African Americans that participated in the study. The effect sizes of several background variables on randomized assignment to experimental condition were examined, including: race, age, gender, income, education, racial attitudes, religion, religiosity, political ideology, political partisanship, need for cognition, genetics knowledge, genetic determinism, optimism, and health locus of control; there were no sizeable effects found for any of the background variables on group assignment (the partial Eta squared ( $\eta_p^2$ ) values indicated weak/no effects, and for all Pearson correlation coefficients:  $r \leq .05$ ). In addition, there were no sizeable effects on group assignment for a) participants' prior assignment in the gPOD study to the discussion group or the pre/post survey-only group (refer to Appendix E for the gPOD project design), and b) whether respondents in the gPOD discussion group opted to participate in the Round 1 focus group discussions; the partial Eta squared ( $\eta_p^2$ ) values indicated weak/no effects, and for both Pearson correlation coefficients:  $r \leq .02$ ).

With regard to the manipulation check items, there were no statistically significant effects of the treatment condition for participants' agreement with the press release's claims regarding the use of race to develop medical treatments for heart disease ( $F(3, 1354) = 1.22, p = .30$ ) and significant risk factors for heart disease ( $F(3, 1362) = 2.41, p = .07$ ). Moreover, there were no statistically significant differences by treatment

condition for participants' recall of the name of the new heart disease drug described in the press release and recall of which racial group benefited from the medical drug; the partial Eta squared ( $\eta_p^2$ ) values indicated weak/no effects, and for both Pearson correlation coefficients:  $r \leq .06$ ). A majority of participants correctly identified the name of the new heart disease drug (96% correct) and the racial group reported to have benefited from the medical treatment (92% correct).

However, there was a statistically significant difference by treatment condition for participants' recall of the significant risk factors for heart disease cited at the end of the press release messages ( $t(1361) = -3.34, p < .01$ ); the results showed that participants in the controllable attribution conditions, regardless of racial cue, were more likely to answer this question incorrectly, as compared to participants in the uncontrollable attribution conditions. This finding may indicate that participants were resistant to the controllable attribution frame, or that the identical background information about genetics and race included in all four messages led respondents in the controllable condition (diet and exercise) to factor in the genetic determinants of heart disease (refer to Appendix C for the stimulus messages). The answer choices for the recall question about risk factors for heart disease may have also been problematic, as a large proportion of the combined sample (38%) answered the question incorrectly because they selected the 'all of the above' option; participants may have chosen this option because two of the three risk factors offered as response options were mentioned in all four versions of the press release message, and they may have assumed that the third option (cigarette smoking) was a plausible risk factor that could have appeared in the message as well.

Overall, a small minority of respondents ( $N = 29$ ) gave incorrect answers to all three recall items, and there were no statistically significant differences by treatment condition ( $t(1390) = .98, p = .40$ ) or respondent race ( $t(1391) = 2.70, p = .10$ ) for participants that answered all three items incorrectly as compared to those that answered two or fewer questions incorrectly. Results of a measure that recorded the amount of time spent on the press release screen-page showed a statistically significant difference in screen time between participants that answered all three recall items incorrectly as compared to those that answered two or fewer items incorrectly ( $t(1390) = -4.53, p < .001$ ). However, there were no statistically significant differences in screen-page time by treatment condition ( $F(3, 1391) = 1.16, p = .32$ ). Participants that answered all three recall items incorrectly were skewed toward substantially shorter reading times, as they averaged 15.83 seconds spent on the webpage as compared to 191.30 seconds for the rest of the sample. Since these 29 participants probably did not read or attend to the press release stimulus messages, they were removed from the sample for the purposes of analysis.

The following sections are organized by each of the three categories of outcome measure in Study 3; the results are presented in the following order: 1) opinions about personalized medicine and race-targeted medical care; 2) causal attributions for heart disease; and 3) distributive and regulatory health policy preferences. The hypotheses are therefore not presented in numerical order but rather by outcome measure in order to allow for a more coherent presentation of the data results.

### ***Opinions about Personalized Medicine and Race-Targeted Medical Care***

This section examines the results of the stimulus messages on participants' opinions about personalized medicine and race-targeted medical care. Three hypotheses (H2c, H3b, and H3c) addressed the effects of intergroup racial cues and controllability attributions on opinions about personalized medicine and race-targeted medical care.

#### **Hypothesis 2c: in- and out-group racial cues**

Hypothesis 2c (H2c) predicted that an in-group racial cue, as compared to an out-group racial cue, would lead to more favorable opinions about personalized medicine. H2c was supported by the data.<sup>22</sup> There was a statistically significant effect of intergroup racial cues on respondents' support for personalized medicine ( $t(1357) = 2.19, p < .05$ ), such that favorability was greater among participants exposed to an in-group racial cue ( $M = 3.63, SD = .63$ ) as compared to an out-group cue ( $M = 3.55, SD = .66$ ). As expected, there was a statistically significant effect of intergroup racial cues for beliefs about whether 'people like me would benefit from personalized medicine' ( $t(1352) = 4.13, p < .001$ ); on average, there was greater support for the idea that personalized medicine would be beneficial among respondents exposed to an in-group racial cue ( $M = 3.43, SD = .88$ ) as compared to an out-group cue ( $M = 3.23, SD = .93$ ).

Among African Americans, an in-group racial cue appeared to diminish concerns about discrimination as a consequence of personalized medicine. There were borderline statistically significant effect of intergroup racial cues for African Americans' concerns

---

<sup>22</sup> The observed effect remained statistically significant after controlling for participants' prior assignment to experimental condition in Study 2.

about personalized medicine limiting some people's access to medical treatment ( $t$  (294) = -1.84,  $p < .07$ ) and discriminating against people that are less responsive to medical treatment ( $t$  (292) = -1.69,  $p < .10$ ). On average, there was greater concern about personalized medicine limiting access to medical care among African Americans that were exposed to an out-group racial cue ( $M = 3.64$ ,  $SD = 1.09$ ) rather than an in-group racial cue ( $M = 3.42$ ,  $SD = .95$ ). Similarly, there was on average greater concern about discrimination as a consequence of personalized medicine among African Americans that were exposed to an out-group racial cue ( $M = 3.44$ ,  $SD = 1.11$ ) as compared to an in-group cue ( $M = 3.23$ ,  $SD = 1.01$ ).

### **Hypothesis 3b: racial cues and controllability**

Hypothesis 3b (H3b) predicted that intergroup racial cues would interact with the controllability attribution manipulation to moderate the effects of the stimulus messages on opinions about personalized medicine, such that favorability would be overall lowest among participants in the controllable attribution/out-group racial cue condition. H3b was not supported, as there was no statistically significant difference in favorability toward personalized medicine between participants in the controllable attribution/out-group racial cue group and participants in the other three experimental conditions ( $t$  (1357) = -1.16,  $p = .25$ ). Table 8.1 depicts respondents' mean favorability toward personalized medicine by racial cue group and controllability attribution group. Although audience's favorability toward personalized medicine by treatment condition was in the expected directions, the mean differences between groups were not large enough to be statistically significant.

### **Hypothesis 3c: racial cues and controllability**

Hypothesis 3c (H3c) predicted that intergroup racial cues would interact with the controllability attribution manipulation to moderate the effects of the stimulus messages on opinions about race-targeted medical care, such that favorability would be overall lowest among participants in the controllable attribution/out-group racial cue condition. The results provided partial support for H3c, as there was a borderline statistically significant effect of intergroup racial cue by controllability attribution for respondents' favorability toward race-targeted medical treatment ( $t(1358) = -1.94, p \leq .05$ ); the results showed that favorability was lowest on average among participants in the uncontrollable/out-group racial cue condition ( $M = 3.04, SD = .98$ ) as compared to the other experimental conditions ( $M = 3.15, SD = .93$ ). Table 8.1 depicts respondents' mean favorability toward race-targeted medical care by intergroup racial cue and controllability attribution. As predicted, favorability toward race-targeted medical care was overall lowest among respondents in the controllable attribution/out-group racial cue condition, regardless of respondent race; participants in the other three treatment conditions were similar in their favorability toward the use of race to provide personalized medicine.<sup>23</sup>

---

<sup>23</sup> There were no statistically significant differences between the other three experimental conditions: in-group cue/uncontrollable versus controllable attribution ( $t(1358) = .87, p = .38$ ); uncontrollable attribution/ in- versus out-group cue ( $t(674) = -.39, p = .69$ ); and in-group cue/controllable attribution versus out-group cue/uncontrollable attribution ( $t(698) = .06, p = .95$ ).



Table 8.1.

*Mean Favorability toward Personalized Medicine and Race-Targeted Medical Care by Intergroup Racial Cue and Controllability Attribution*

Message Features		Personalized Medicine			Race-Targeted Medical Care		
		<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>N</i>
In-Group Racial Cue	Uncontrollable Attribution	3.62	.61	323	3.13	.94	323
	Controllable Attribution	3.64	.64	347	3.16	.93	347
Out-Group Racial Cue	Uncontrollable Attribution	3.55	.66	353	3.16	.98	353
	Controllable Attribution	3.55	.66	336	3.04	.95	337

### Research Questions: education and racial attitudes as moderators

Two research questions asked whether education (RQ1) and racial attitudes (RQ2) moderated the effects of the stimulus messages on opinions about personalized medicine and race-targeted medical care. Firstly, to examine whether *education* moderated the effects of the stimulus messages on opinions about personalized medicine and race-targeted medical care, ANOVA models were run predicting each outcome variable by education level (coded in years of education), respondent race, each treatment condition (controllability attribution and intergroup racial cue), and the two-way interactions between education and each of the treatment conditions.<sup>24</sup> Education did not moderate the effects of the experimental manipulations on opinions about personalized medicine or

<sup>24</sup> Subsequently, another set of ANOVA models was run predicting each outcome variable by education level, respondent race, each experimental condition (controllability attribution and intergroup racial cue), and the three-way interaction among educational level, controllability attribution and intergroup racial cue; the models showed no statistically significant three-way interaction effects involving education and the experimental manipulations.

race-targeted medical care.<sup>25</sup> However, there was a statistically significant main effect of education for respondents' favorability toward personalized medicine ( $F(5, 1359) = 3.53$ ,  $p < .01$ ), such that support for personalized medicine was on average lowest among high school graduates ( $M = 3.48$ ,  $SD = .69$ ) and highest among participants with a master's degree ( $M = 3.71$ ,  $SD = .66$ ). In general, respondents with higher levels of education tended to be more favorable toward personalized medicine than those with less education. There were no other statistically significant main effects of education for participants' opinions about personalized medicine or race-targeted medical care.

To examine whether *racial attitudes* moderated the effects of the stimulus messages on opinions about personalized medicine and race-targeted medical care, ANOVA models were run predicting each outcome variable by racial attitudes (coded categorically), respondent race, each experimental condition (controllability attribution and intergroup racial cue), and the two-way interactions between racial attitudes and each of the experimental conditions, controlling for age.<sup>26</sup> Results showed that racial attitudes moderated the effects of the experimental manipulations on respondents' opinions about personalized medicine and race-targeted medical care.

There was a statistically significant two-way interaction effect of message controllability attribution and pre-existing racial attitudes for respondents' favorability

---

<sup>25</sup> The results of the ANOVA models involving education were compared against the results of regression models to assess the moderating effects of education; the results were consistent across both sets of analyses.

<sup>26</sup> Subsequently, another set of ANOVA models was run predicting each outcome variable by racial attitudes, respondent race, each experimental condition (controllability attribution and intergroup racial cue), and the three-way interaction among racial attitudes, controllability attribution and intergroup racial cue, controlling for age; the models found no statistically significant three-way interaction effects involving racial attitudes and the experimental manipulations. Age was controlled for in all ANOVA models involving racial attitudes due to differences in participants' response rates to the racial attitudes measures by age.

toward personalized medicine ( $F(3, 1121) = 3.45, p < .05$ ). A pattern of effect was observed such that participants with neutral or egalitarian racial attitudes tended to be slightly more favorable toward personalized medicine in response to the uncontrollable attribution (genetic) message, but respondents that favored their racial out-group or strongly favored their racial in-group were more favorable toward personalized medicine in response to the controllable attribution (behavioral) message. After controlling for respondent race and intergroup racial cue as covariates in the ANOVA model, the observed two-way interaction effect of controllability attribution and racial attitudes remained statistically significant.

Figure 8.1 depicts the interaction effect of message controllability attributions by racial attitudes for participants' favorability toward personalized medicine. For participants that favored their racial out-group, there was a statistically significant effect of message controllability attributions ( $t(145) = -2.22, p < .05$ ), such that favorability toward personalized medicine was greatest among those in the controllable attribution group ( $M = 3.73, SD = .63$ ) and lowest in the uncontrollable attribution group ( $M = 3.48, SD = .70$ ). There was also a borderline statistically significant difference between message controllability conditions for participants that strongly favored their racial in-group ( $t(104) = -1.96, p < .06$ ), such that favorability toward personalized medicine was greater for those in the controllable attribution group ( $M = 3.68, SD = .66$ ) rather than the uncontrollable attribution group ( $M = 3.46, SD = .52$ ).

Although participants that strongly favored their racial in-group and those that favored their racial out-group may have possessed differing worldviews, they appeared to

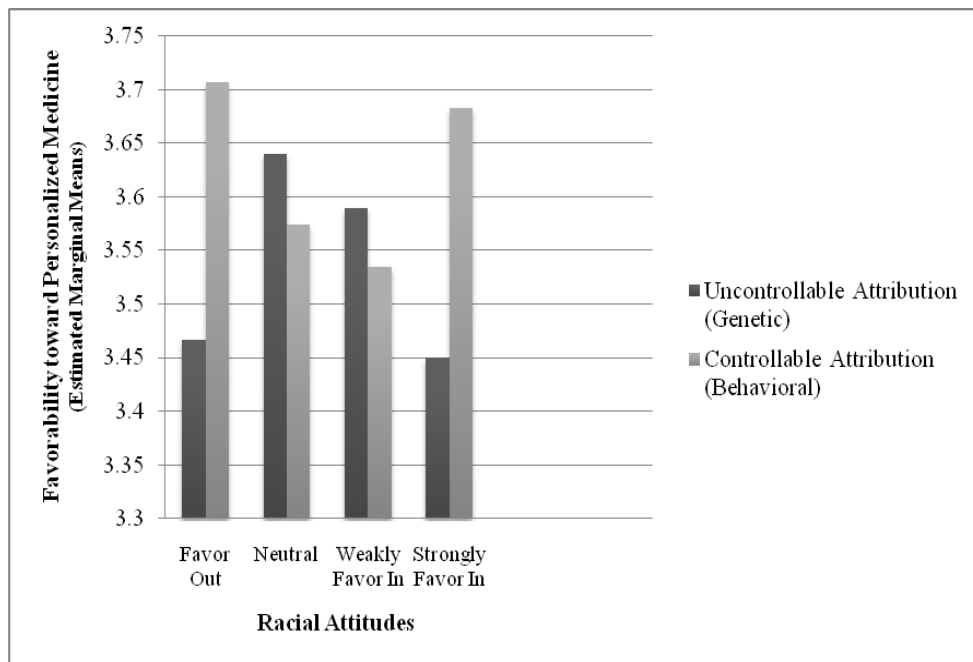
respond to the controllability manipulation in a similar way; however, the underlying reasons for the observed pattern of effect may be quite different between these two groups of respondents. Participants that favored their racial out-group were probably more socially liberal, and they may have been opposed to the idea that health disparities may be associated with genetic differences across racial groups; for these participants, the uncontrollable attribution (genetic) message may have heightened concerns about discrimination as a consequence of linking genetics and race with health. Whereas participants that strongly favored their racial in-group may have held more prejudiced racial views, they may have also questioned the notion that health disparities could be associated with factors that are outside of a person's control; for these participants, the controllable attribution (behavioral) message was probably more consistent with their underlying social stereotypes (e.g., that some types of people are inherently lazy or unhealthy).

Thus, different worldviews may have led participants with disparate racial views to appear to respond to the controllability manipulation in a similar way; yet, the underlying reasons for the observed pattern of effect was likely quite different for these groups of respondents. Moreover, the interaction effect may have been influenced by differences in the perceived credibility of the stimulus messages based on pre-existing racial attitudes; this supposition is supported by evidence that when participants' agreement with the press release message was included in the model as a control variable, the interaction effect of controllability attributions and racial attitudes became non-significant. Of course, it is possible that the measure of agreement with the stimulus

message may have been a surrogate for participants' favorability toward personalized medicine.

*Figure 8.1.*

Interaction Effect of Controllability Attribution and Racial Attitudes on Favorability toward Personalized Medicine

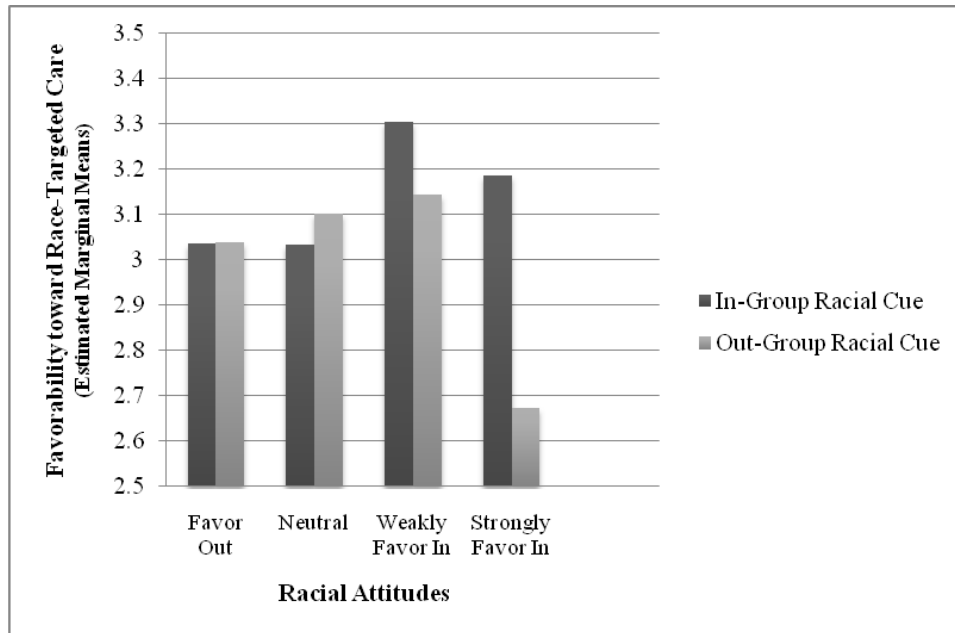


In addition to the effects of racial attitudes and controllability attributions on participants' favorability toward personalized medicine, racial attitudes also interacted with intergroup racial cues to moderate participants' opinions about race-targeted medical care. As might be expected, there was a statistically significant two-way interaction effect of intergroup racial cues and racial attitudes for participants' favorability toward race-targeted medical care ( $F(3, 1122) = 3.10, p < .05$ ), such that favorability was overall lowest among participants in the out-group racial cue condition that strongly favored their racial in-group ( $M = 2.67, SD = .96$ ). Among participants that strongly favored their

racial in-group, there was a statistically significant effect of intergroup racial cues for favorability toward race-targeted care ( $t(1120) = 2.84, p < .01$ ), and the observed effect was consistent across racial groups. Figure 8.2 depicts the interaction effect of intergroup racial cue group by racial attitudes for respondents' favorability toward race-targeted medical care. For participants that favored their own racial group, an in-group racial cue led to more favorability toward race-targeted medical care, as compared to an out-group racial cue. As might be expected, there was almost no mean difference in favorability toward race-targeted medical care by intergroup racial cue condition for participants that held neutral/egalitarian or pro-out-group racial views. In addition, there was also a statistically significant main effect of racial attitudes ( $F(3, 1122) = 3.80, p < .05$ ), such that favorability toward race-targeted medical care was overall lowest among participants that strongly favored their racial in-group ( $M = 2.93, SD = .97$ ).

Figure 8.2.

Interaction Effect of Intergroup Racial Cue and Racial Attitudes on Favorability toward Race-Targeted Medical Care



*Summary.* Overall, the results showed that message controllability attribution and intergroup racial cue influenced participants' opinions about personalized medicine and race-targeted medical care. The intergroup racial cue manipulation influenced people's favorability toward personalized medicine; as expected, participants exposed to an in-group racial cue were more favorable toward personalized medicine than those exposed to an out-group cue. However, the message features did not interact with each other to moderate the effects of the stimulus messages on participants' opinions about personalized medicine. The only evidence of an interaction effect involving the message features occurred for people's opinions about race-targeted medical care. Participants that received an out-group racial cue and uncontrollable attribution message were less supportive of race-targeted medical care than their counterparts in the other three

experimental conditions. With regard to background variables, education did not moderate the effects of the stimulus messages, but racial attitudes interacted with both controllability attributions and intergroup racial cues to influence respondents' favorability toward personalized medicine and race-targeted medical care.

### ***Causal Attributions for Heart Disease (External and Internal)***

The following section analyzes the effects of the stimulus messages on participants' causal attributions for heart disease. Two hypotheses (H1b and H2b) addressed the effects of message controllability attribution and intergroup racial cue on respondents' external and internal causal attributions.

#### **Hypothesis 1b: controllability**

Hypothesis 1b (H1b) predicted that the uncontrollable message, as compared to the controllable message, would lead audiences to make more external causal attributions and fewer internal causal attributions for heart disease. Results of the general attribution items supported this hypothesis. There was a statistically significant main effect of the controllability manipulation for respondents' external causal attributions ( $t(1355) = 2.12$ ,  $p < .05$ ) and internal causal attributions ( $t(1358) = -2.00$ ,  $p < .01$ ). As predicted, the uncontrollable attribution message, as compared to the controllable attribution message, led audiences to make more external causal attributions and fewer internal causal attributions. There was on average greater agreement with the general external causal attribution items among participants in the uncontrollable group ( $M = 2.65$ ,  $SD = .85$ ) as compared to the controllable group ( $M = 2.55$ ,  $SD = .87$ ). In addition, there was on average greater agreement with the general internal causal attributions items among



participants in the controllable group ( $M = 3.36$ ,  $SD = .69$ ) as compared to those in the uncontrollable group ( $M = 3.25$ ,  $SD = .73$ ).

The effects of the specific causal attributions were less robust. There was slightly greater agreement with the specific external causal attribution items among participants in the uncontrollable group ( $M = 3.15$ ,  $SD = .67$ ) as compared to the controllable group ( $M = 3.10$ ,  $SD = .64$ ), but the difference between groups was not statistically significant ( $t(1359) = 1.42$ ,  $p = .16$ ). There was lower agreement with the specific internal causal attribution items among participants in the uncontrollable group ( $M = 3.28$ ,  $SD = .63$ ) as compared to those in the controllable group ( $M = 3.34$ ,  $SD = .61$ ), and the difference between groups was statistically significant at the .10 level using a two-tailed statistical test ( $t(1359) = -1.72$ ,  $p = .09$ ).

### **Hypothesis 2b: in- and out-group racial cues**

Hypothesis 2b (H2b) predicted that an in-group racial cue, as compared to an out-group racial cue, would guide audiences to make more external causal attributions and fewer internal causal attributions. The results offered limited support for H2b. The effects of intergroup racial cues approached statistical significance for the specific external attribution items ( $t(1359) = 1.73$ ,  $p < .09$ ); on average, there was greater agreement with the external causal attribution items among participants that were exposed to an in-group racial cue ( $M = 3.15$ ,  $SD = .64$ ) as compared to an out-group racial cue ( $M = 3.09$ ,  $SD = .67$ ). However, there were no other statistically significant differences between intergroup racial cue groups for participants' causal attributions.

Respondent race had a statistically significant main effect for participants' general external causal attributions ( $F(1, 1357) = 13.47, p < .001$ ); on average, there was greater agreement with the external causal attributions for heart disease among African Americans ( $M = 2.76, SD = .86$ ) than among Whites ( $M = 2.55, SD = .85$ ). The same pattern of effect by respondent race was also observed for the specific external attribution items ( $F(1, 1361) = 6.60, p < .05$ ), as there was greater agreement with the specific external causal attributions among African Americans ( $M = 3.21, SD = .65$ ) than among Whites ( $M = 3.10, SD = .65$ ). There were no other statistically significant differences by racial cue group or respondent race for participants' causal attributions for heart disease.

### **Research Questions: education and racial attitudes as moderators**

To examine whether education and racial attitudes moderated the effects of the stimulus messages on causal attributions for heart disease, ANOVA models were run predicting each outcome variable by education/racial attitudes, respondent race, each experimental condition (controllability attribution and intergroup racial cue), and the two-way interactions between education/racial attitudes and each of the treatment conditions.<sup>27</sup> There were no statistically significant interaction effects of the background variables and experimental conditions on participants' causal attributions for heart disease.<sup>28</sup> However, there was a statistically significant main effect of education for the

---

<sup>27</sup> Subsequently, another series of ANOVA models were run predicting each outcome variable by education/racial attitudes, respondent race, each experimental condition (controllability attribution and intergroup racial cue), and the three-way interaction among educational level/racial attitudes, controllability attribution and intergroup racial cues; the models showed no statistically significant three-way interaction effects involving the background variables and the experimental manipulations.

<sup>28</sup> The results of the ANOVA models involving education were compared against the results of regression models to assess the moderating effects of education; the results were consistent across both sets of analyses.

specific internal causal items ( $F(5, 1361) = 3.69, p < .01$ ); on average, attributions to internal causal explanations for heart disease were lowest among participants with less than a high school education ( $M = 3.08, SD = .63$ ) and highest among those with a master's degree ( $M = 3.40, SD = .64$ ). Across education levels, respondents with higher levels of education tended to make more internal causal attributions for heart disease than less educated participants.

*Summary.* The results of the causal attribution items offered some evidence to suggest that controllability attributions in media messages influence people's opinions about the causes of health problems and illness. Controllability message framing directly influenced audience's general causal attributions for heart disease. As predicted, the controllable attribution message emphasizing behavioral risk factors for heart disease led participants to make more internal causal attributions and fewer external causal attributions for heart disease. However, there was only limited evidence that intergroup racial cues influenced respondents' causal attributions. In addition, education and racial attitudes were not shown to moderate the effects of the stimulus messages on audiences' causal attributions for heart disease.

### ***Health Policy Preferences (Distributive and Regulatory)***

The following section analyzes the effects of the stimulus messages on participants' health/science policy preferences. Causal attributions are examined as a possible mediator in the effects of controllability attributions on policy opinions. Six hypotheses (H1a, H1c, H2a, H3a, H4a and H4b) addressed the effects of controllability attributions, intergroup racial cues, and causal attributions on distributive and regulatory

policy preferences. Table 8.2 depicts the zero-order correlations among controllability attributions, causal attributions, and policy opinions. The message controllability attribution manipulation was significantly correlated with general causal attributions and regulatory policy preferences, but the magnitude of these relationships was not large. The relationships among internal attributions and external attributions were highly statistically significant; the correlations for these items were in the expected directions, with one exception: the positive relationship between specific internal and external causal attributions. Moreover, specific external attributions were positively correlated with both the distributive and regulatory policy opinions. Counter to expectations, the health policies were *positively* inter-correlated, evidencing that participants did not differentiate between distributive policies and regulatory policies.

Table 8.2.

*Zero-Order Correlations among Controllability Attribution, Causal Attributions, and Policy Preferences*

	1.	2.	3.	4.	5.	6.	7.	8.
1. Controllability Message Attribution	-							
2. External Attributions (general)	.06*	-						
3. External Attributions (specific)	.04	.14***	-					
4. Internal Attributions (general)	-.08**	-.34***	-.07*	-				
5. Internal Attributions (specific)	-.05	-.23***	.30***	.34***	-			
6. Distributive Policies	.03	.02	.23***	-.04	.09**	-		
7. Regulatory Policies	.06*	.04	.26***	.03	.11***	.58***	-	
8. Regulatory - Life Insurance Policy	.03	.06*	-.02	.11***	-.04	.14***	.12***	-

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ Note.  $N = 1352 - 1363$ 

Note. Controllability message attribution was coded as 'Controllable' (0) and 'Uncontrollable' (1).

### **Hypothesis 1a: controllability**

Hypothesis 1a (H1a) predicted that exposure to the uncontrollable attribution message, as compared to the controllable attribution message, would lead audiences to have more positive opinions about distributive policies and more negative opinions about regulatory policies. H1a was not supported for the distributive policy measures, as the uncontrollable message did not lead to greater support for the distributive policy measures than the controllable message ( $t(1361) = .95, p = .33$ ); however, the observed means were in the expected direction, as participants in the uncontrollable message group were on average slightly more favorable toward the distributive policies ( $M = 3.15, SD = .93$ ) as compared to participants in the controllable message group ( $M = 3.10, SD = .97$ ).

There was a statistically significant main effect of controllability attributions for respondents' regulatory policy preferences ( $t(1353.27) = 2.09, p < .05$ )<sup>29</sup>; counter to expectations, however, participants in the uncontrollable message group were on average *more* supportive of the regulatory policy measures ( $M = 3.57, SD = .81$ ) than participants in the controllable message group ( $M = 3.47, SD = .88$ ). Examining the effects of the controllability attribution manipulation for each of the regulatory policy items provides a rationale for the observed pattern of effects. The only statistically significant and borderline significant effects of controllability attributions were for responses to the two regulatory policy items that measured support for policies requiring genetic testing to aid

---

<sup>29</sup> The observed effect remained statistically significant after controlling for participants' prior assignment to experimental condition in Study 2.

in medical treatment. There was a statistically significant difference between groups regarding support for ‘a policy requiring genetic testing for all patients before they are prescribed Paxon to determine if the drug is right for their genetic makeup’ ( $t(1347.95) = 2.79, p < .01$ ); results showed that there was greater support for this policy among participants in the uncontrollable group ( $M = 3.71, SD = .98$ ) as compared to those in the controllable attribution group ( $M = 3.55, SD = 1.09$ ). In addition, there was a borderline statistically significant effect of the controllability attribution manipulation for participants’ support for ‘a policy requiring genetic testing for all patients to help doctors provide medical care that is tailored to each person’s genetic makeup’ ( $t(1355) = 1.70, p < .10$ ); as before, there was greater support for the measure among respondents in the uncontrollable condition ( $M = 3.32, SD = 1.17$ ) as compared to those in the controllable condition ( $M = 3.21, SD = 1.24$ ).

It is perhaps not surprising that participants in the uncontrollable attribution condition were more likely to support policy measures requiring genetic testing as compared to participants in the controllable attribution group; after all, the uncontrollable message emphasized the importance of genetic risk factors for heart disease and the controllable message focused on behavioral health risks. Participants in the uncontrollable attribution group were therefore more likely to consider the potential benefits of requiring genetic testing for the treatment of heart disease, and support these policy measures. There were no other statistically significant differences between the controllability attribution groups for the regulatory policy measures, including the non-scaled regulatory item that asked whether life insurance providers should be allowed to adjust premiums based on risk factors for heart disease ( $t(1355) = .95, p = .34$ ).

### **Hypothesis 1c: mediation**

Hypothesis 1c (H1c) predicted that the relationship between controllability attributions and policy preferences would be partially mediated by causal attributions. H1c was not supported by the data. Sobel's test produced no evidence of a statistically significant mediation path from message controllability attributions to regulatory policy preferences via causal attributions for heart disease (both general and specific causal attributions).

However, there was some evidence of a direct effect of causal attributions on policy preferences. There was a statistically significant main effect of external causal attributions (specific) for participants' distributive policy preferences ( $t(1360) = 8.66$ ,  $p < .001$ ;  $B = .33$ ,  $SE = .04$ ) and regulatory policy preferences ( $t(1360) = 9.88$ ,  $p < .001$ ;  $B = .34$ ,  $SE = .03$ ); the results remained statistically significant after controlling for a range of background variables, including: political ideology, political partisanship, age, income, racial attitudes, internal causal attributions (specific), knowledge about genetics, and attention to news about science and health. As would be expected, greater agreement with the external causal attributions led to more distributive policy preferences. Counter to expectations, however, external causal attributions had a positive effect on respondents' regulatory policy preferences, as greater agreement with the external causal attributions led to greater support for the regulatory policy measures. Taken together, the results indicate that participants failed to differentiate between the regulatory and distributive policies, resulting in a similar pattern of results for the two types of health policy.



## **Hypothesis 2a: intergroup racial cues**

Hypothesis 2a (H2a) predicted that an in-group racial cue, as compared to an out-group racial cue, would increase distributive policy preferences and decrease regulatory policy preferences. H2a was supported for the distributive policy measures, but not the regulatory policy measures. There was a statistically significant main effect of the intergroup racial cue for participants' distributive policy preferences ( $t(1361) = 2.16, p < .05$ )<sup>30</sup>. As predicted, participants across both racial groups were on average more supportive of the distributive policies following exposure to an in-group racial cue ( $M = 3.18, SD = .92$ ) as compared to an out-group racial cue ( $M = 3.07, SD = .97$ ). However, there were no significant differences by intergroup racial cue for participants' regulatory policy opinions ( $t(1361) = 1.48, p = .14$ ) or support for the policy item regarding life insurance premiums ( $t(1355) = .72, p = .47$ ). For both Whites and African Americans, the intergroup racial cue failed to influence respondents' regulatory policy preferences.

In order to examine whether respondent race moderated the effects of intergroup racial cues on distributive policy preferences, an ANOVA model was run predicting distributive policy opinions by intergroup racial cue, respondent race, and the interaction between intergroup racial cue and respondent race. Results showed that there was a statistically significant interaction effect of intergroup racial cues and respondent race for participants' distributive policy opinions ( $F(1, 1363) = 9.25, p < .01$ ). The main effect of intergroup racial cues was also statistically significant ( $F(1, 1363) = 12.45, p < .001$ ), but the main effect of respondent race was not statistically significant ( $F(1, 1363) = 1.50, p =$

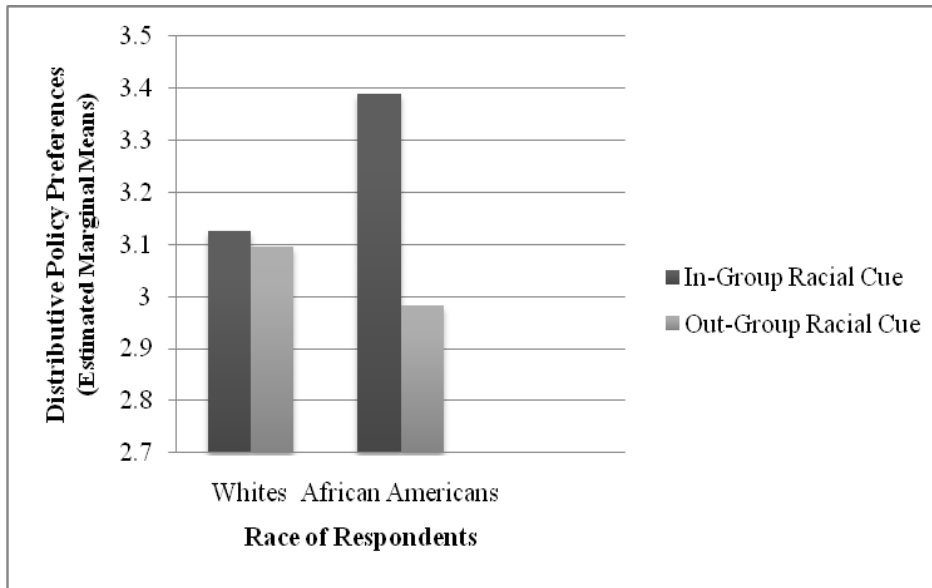
---

<sup>30</sup> The observed effect remained statistically significant after controlling for participants' prior assignment to experimental condition in Study 2.

.22). Across racial groups, participants that were exposed to an in-group racial cue had greater distributive policy preferences than those exposed to an out-group cue. However, the observed effect of intergroup racial cues appeared to be larger for African Americans. Whereas Whites were somewhat more supportive of the distributive policies in the presence of an in-group racial cue, African Americans were significantly more supportive of these policies following an in-group cue. The difference between African Americans by racial cue condition was highly statistically significant ( $t(294) = 3.65, p < .001$ ), with greater support for the distributive policies among African Americans exposed to an in-group racial cue ( $M = 3.39, SD = .87$ ) as compared to an out-group cue ( $M = 2.98, SD = 1.04$ ). Figure 8.3 depicts the interaction effect of respondent race and intergroup racial cues for participants' distributive policy preferences. As shown on the figure, cueing in-group racial status was particularly influential for African Americans' distributive policy opinions regarding personalized medicine and genetic testing. The results therefore indicate that race of respondents was an important consideration in the effects of intergroup racial cues on distributive policy opinions.

Figure 8.3.

Interaction Effect of Intergroup Racial Cue and Race on Distributive Policy Preferences



### Hypothesis 3a: controllability by intergroup racial cue

Hypothesis 3a (H3a) predicted that message controllability attribution and intergroup racial cue would interact to moderate the effects of the stimulus messages on policy preferences, such that distributive policy preferences would be overall lowest among participants in the controllable attribution/out-group racial cue condition. H3a was partially supported, as there was a significant effect of intergroup racial cues and controllability attributions for respondents' distributive policy opinions ( $t(1361) = -1.77$ ,  $p < .10$ ) at the .10 level using a two-tailed statistical test; the results showed that support for the distributive policies was overall lowest among participants in the uncontrollable/out-group racial cue condition ( $M = 3.05$ ,  $SD = 1.00$ ) as compared to the other three experimental conditions ( $M = 3.15$ ,  $SD = .93$ ).

The same pattern of effect was observed for participants' regulatory policy opinions. There was a statistically significant effect of treatment condition for respondents' regulatory policy preferences ( $t(1361) = -2.45, p < .05$ ); results showed that support for the regulatory policy measures was on average lower among participants in the controllable attribution and out-group racial cue treatment condition ( $M = 3.42, SD = .89$ ) and higher among participants in the other three conditions ( $M = 3.55, SD = .83$ ). The findings offer additional evidence to suggest that participants failed to differentiate between the distributive and regulatory policy measures. Table 8.3 depicts participants' mean support for the distributive policies by experimental condition, and Table 8.4 shows respondents' average support for the regulatory policies by treatment condition. As shown on the tables, support for the policy measures was on average lowest among participants that were exposed to a controllable attribution and out-group racial cue stimulus message.

Table 8.3.

*Mean Support for Distributive Policies by Intergroup Racial Cue and Controllability Attribution*

Message Features		Distributive Policies		
		<i>M</i>	<i>SD</i>	<i>n</i>
In-Group Racial Cue	Uncontrollable Attribution	3.23	1.00	324
	Controllable Attribution	3.17	1.01	347
Out-Group Racial Cue	Uncontrollable Attribution	3.11	1.00	354
	Controllable Attribution	3.06	.99	338

Table 8.4.

*Mean Support for Regulatory Policies by Intergroup Racial Cue and Controllability Attribution*

Message Features		Regulatory Policies			Regulatory Policy - Life Insurance		
		<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
In-Group Racial Cue	Uncontrollable Attribution	3.64	.90	324	2.11	1.17	323
	Controllable Attribution	3.57	.89	347	2.03	1.17	345
Out-Group Racial Cue	Uncontrollable Attribution	3.60	.88	354	2.05	1.16	351
	Controllable Attribution	3.47	.88	338	2.01	1.16	338

The fourth set of hypotheses addressed the main effects of opinions about personalized medicine and race-targeted medical care on respondents' health policy preferences. Based on Lowi's (1964) policy typology, it was expected that greater favorability toward personalized medicine and race-targeted medical treatment would increase distributive policy preferences and decrease regulatory policy preferences.

#### **Hypothesis 4a: favorability toward personalized medicine**

H4a predicted that favorable opinions about personalized medicine would increase distributive policy preferences and decrease regulatory policy preferences. The results partially supported H4a. Regression models were run predicting responses to each type of policy by the scale measures of favorability toward personalized medicine. As predicted, participants' favorability toward personalized medicine had a statistically significant, positive main effect on distributive policy preferences ( $t(1358) = 17.28$ ,  $p < .001$ ;  $B = .63$ ,  $SE = .04$ ). Greater favorability toward personalized medicine

translated into more support for the distributive policies. The observed effect remained statistically significant after controlling for respondent race, education, income, political ideology, political partisanship, knowledge about genetics, and attention to news about science and health.

Counter to expectations, however, favorability toward personalized medicine also produced a statistically significant, *positive* main effect on regulatory policy preferences ( $t(1358) = 16.60, p < .001; B = .54, SE = .03$ ); as before, the observed effect remained statistically significant after controlling for respondent race, education, income, political ideology, political partisanship, knowledge about genetics, and attention to news about science and health. Yet, favorability toward personalized medicine was not a statistically significant predictor of participants' responses to the separate regulatory policy item on life insurance premiums ( $t(1353) = .05, p = .96$ ). Overall, the results provide further evidence to suggest that participants did not differentiate between the two classifications of policy measures, as favorable opinions about personalized medicine increased distributive and regulatory policy preferences.

#### **Hypothesis 4b: favorability toward race-targeted medical care**

Hypothesis 4b (H4b) predicted that favorable opinions about race-targeted medical care would increase distributive policy preferences and decrease regulatory policy preferences. The results partially supported H4b. Regression models were run predicting each class of policy opinions by participants' favorability toward race-targeted medical care. As expected, there was a statistically significant, positive main effect of favorability toward race-targeted medical care for distributive policy opinions ( $t(1359) = 17.71, p < .001; B = .43, SE = .02$ ). Great favorability toward race-targeted medical care

translated into more support for the distributive policies. The observed effect remained statistically significant after controlling for respondent race, education, income, political ideology, political partisanship, knowledge about genetics, and attention to news about science and health.

There was also a statistically significant main effect of favorability toward race-targeted medical care for regulatory policy preferences, but the effect was not in the expected direction; as with opinions about personalized medicine, favorability toward race-targeted medical care had a statistically significant, *positive* effect on regulatory policies preferences ( $t(1359) = 11.56, p < .001; B = .27, SE = .02$ ). A similar pattern of effect was found for the regulatory policy measure on life insurance premiums; the results revealed a statistically significant, *positive* main effect of respondents' favorability toward race-targeted medical care on support for a policy allowing life insurance providers to adjust premiums based on risk factors for common diseases like heart disease ( $t(1354) = 6.01, p < .001; B = .19, SE = .03$ ). The main effects of favorability toward race-targeted care for the regulatory policy preferences remained statistically significant after controlling for respondent race, education, income, political ideology, political partisanship, knowledge about genetics, attention to news about science/health, and opinions about personalized medicine. The results showed that favorability toward race-targeted medical care led to greater support for all types of health policy, regardless of policy classification. Once again, the results indicate that participants' opinions were not differentiated by the regulatory and distributive nature of the policy measures.

## **Research Questions**

The two research questions asked whether education and racial attitudes moderated the effects of message controllability attribution and intergroup racial cue on health/science policy preferences. Table 8.5 depicts the zero-order correlations among education, racial attitudes, political ideology, and the outcome measures (favorability toward personalized medicine, causal attributions for heart disease, and policy preferences). Education and racial attitudes were both significantly correlated with some policy items, but the magnitude of the relationships was not large. Political ideology was shown to be more strongly correlated with the policy measures than either education or racial attitudes.



Table 8.5.

*Zero-Order Correlations among Education, Racial Attitudes, Political Ideology, Favorability toward Personalized Medicine, Causal Attributions, and Policy Preferences*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Education	-									
2. Racial Attitudes	-.07*	-								
3. Political Ideology	.07*	-.11***	-							
4. Favorability toward Personalized Medicine	.10***	-.31	.11***	-						
5. External Attributions (General)	-.19***	.02	.03	-.11***	-					
6. Internal Attributions (General)	.06*	.01	-.08**	.08**	-.34***	-				
7. External Attributions (Specific)	.03	.07*	.06*	.30***	.14***	-.07*	-			
8. Internal Attributions (Specific)	.10***	.01	.00	.16***	-.23***	.34***	.30***	-		
9. Distributive Policies	.10***	-.08**	.24***	.43***	.02	-.04	.23***	.09**	-	
10. Regulatory Policies	-.04	-.07*	.23***	.41***	.04	.03	.26***	.11***	.58***	-
11. Regulatory Policy – Life Insurance	-.08**	.01	-.05	.00	.06*	.11***	-.02	-.04	.14***	.12***

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Note.  $N = 1120 - 1363$

Note. Political ideology was coded as 'strongly Conservative' (1) to 'strongly Liberal' (7). Education was coded in number of years of education. Racial attitudes was coded as a scale measure from 'strongly out-group favorable' (-100) to 'strongly in-group favorable' (100).

In order to assess whether education moderated the effects of the stimulus messages on policy preferences, ANOVA models were run predicting each type of policy by education, respondent race, each treatment condition (controllability attribution and intergroup racial cue), and the two-way interactions between education and each of the treatment conditions.<sup>31</sup> Education was not shown to moderate the effects of the experimental manipulations for any of the policy measures.<sup>32</sup> However, there was a statistically significant main effect of education for both distributive policy preferences ( $F(5, 1363) = 5.93, p < .001$ ) and regulatory policy preferences ( $F(5, 1363) = 3.63, p < .01$ ). As might be expected, participants with higher levels of education were on average more supportive of the distributive policies and less supportive of the regulatory policies, as compared to participants with lower levels of education.<sup>33</sup>

To examine whether racial attitudes moderated the effects of the stimulus messages on policy preferences, ANOVA models were run predicting each policy measure by racial attitudes, respondent race, each treatment condition (controllability

---

<sup>31</sup> Subsequently, another set of ANOVA models was run predicting each policy outcome by education level, respondent race, each experimental condition (controllability attribution and intergroup racial cue), and the three-way interaction among educational level, controllability attribution and intergroup racial cues; the models showed no statistically significant three-way interaction effects involving education and the experimental manipulations for policy opinions.

<sup>32</sup> The results of the ANOVA models involving education were compared against the results of regression models to assess the moderating effects of education; the results were consistent across both sets of analyses.

<sup>33</sup> There was greatest support for the distributive policies among participants with a professional or doctorate degree ( $M = 3.48, SD = .95$ ) and lowest support among participants with a high school education ( $M = 3.06, SD = 1.02$ ). The scale measure of regulatory policies showed that support for regulatory policies was on average highest among participants with less than a high school education ( $M = 3.93, SD = .87$ ) and lowest among those with a college degree ( $M = 3.48, SD = .88$ ). Education also had a statistically significant main effect for participants' support of the separate regulatory policy item regarding life insurance premiums ( $F(5, 1357) = 3.21, p < .01$ ), such that there was on average greatest support for the policy among participants with less than a high school education ( $M = 2.60, SD = 1.12$ ) and lowest support among participants with a professional or doctorate degree ( $M = 3.48, SD = 1.11$ ).

attribution and intergroup racial cue), and the two-way interactions between racial attitudes and each of the treatment conditions, controlling for age.<sup>34</sup> Across racial groups, there was a statistically significant two-way interaction effect of intergroup racial cue by racial attitudes for participants' distributive policy preferences ( $F(3, 1124) = 3.46, p < .05$ ). Figure 8.4 depicts the interaction effect of intergroup racial cue by racial attitudes for participants' distributive policy opinions. As might be expected based on the literature, there was a statistically significant effect of intergroup racial cue group among participants that favored their racial in-group ( $t(503) = 2.49, p < .05$ ). Respondents that strongly or slightly favored their racial in-group had more distributive policy preferences after exposure to an in-group racial cue ( $M = 3.22, SD = .91$ ) as compared to an out-group cue ( $M = 3.00, SD = .97$ ). The results also showed that distributive policy preferences were on average lowest among participants that strongly favored their racial in-group and received an out-group racial cue message ( $M = 2.71, SD = .95$ ).

Participants that held neutral or egalitarian racial views expressed equivalent levels of policy support regardless of intergroup racial cue group; as might be expected based on the literature, among racially-neutral respondents, there was no statistically significant difference by intergroup racial cue for distributive policy preferences ( $t(468) = -1.03, p = .30$ ). However, for participants that favored their racial out-group, there was a statistically significant difference by intergroup racial cue for distributive policy

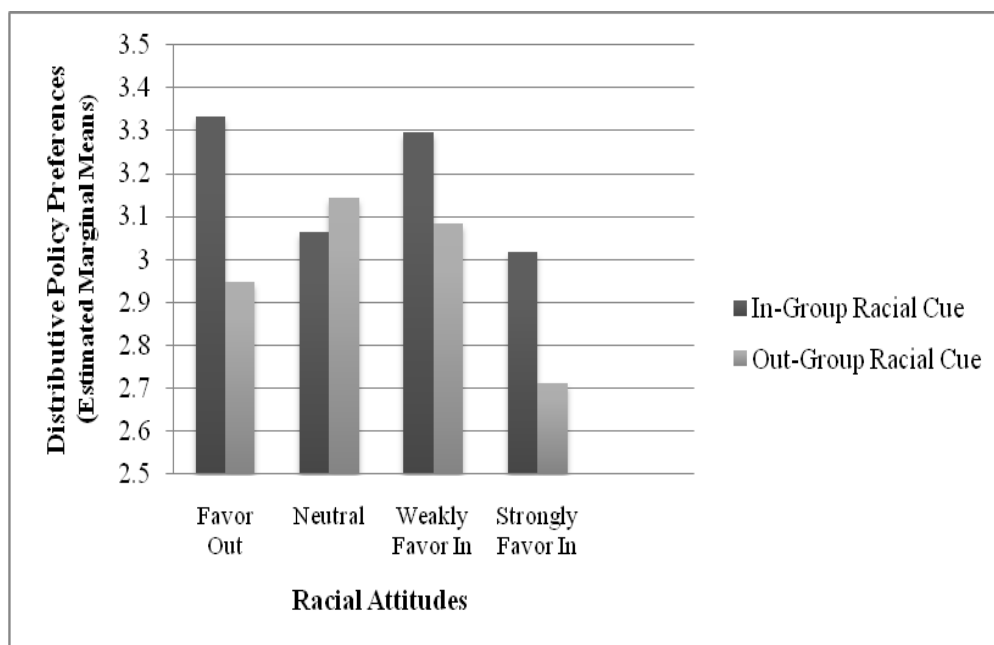
---

<sup>34</sup> Subsequently, another set of ANOVA models was run predicting each outcome variable by racial attitudes, respondent race, each experimental condition (controllability attribution and intergroup racial cue), and the three-way interaction among racial attitudes, controllability attribution and intergroup racial cues, controlling for age; the models found no statistically significant three-way interaction effects involving racial attitudes and the experimental manipulations for policy opinions.

preferences ( $t(147) = 2.56, p < .05$ ), such that there was greater distributive policy preferences following an in-group racial cue ( $M = 3.34, SD = .87$ ) as compared to an out-group cue ( $M = 2.94, SD = 1.04$ ). It is possible that these participants' favorability toward their racial out-group was strongly influenced by a social desirability bias, and their distributive policy preferences offered an indication of their underlying bias in favor of their racial in-group. It is worth noting that respondent race did not moderate the observed effects; rather, the effects were consistent across racial groups. There was also a statistically significant main effect of racial attitudes for participants' distributive policy preferences ( $F(3, 1124) = 3.48, p < .05$ ), such that support for these policies was on average lowest among those that strongly favored their racial in-group ( $M = 2.86, SD = .96$ ).

Figure 8.4.

Interaction Effect of Intergroup Racial Cue and Racial Attitudes on Distributive Policy Preferences



*Summary.* The results of the policy measures revealed several interesting findings regarding the effects of message attributions and intergroup racial cues on participants' health policy preferences. There was evidence that participants generally failed to differentiate between the distributive and regulatory policy items.<sup>35</sup> Firstly, the two types of policies were positively, and significantly correlated ( $a = .58, p < .001$ ). In addition, favorable opinions about personalized medicine and genetically-targeted care increased distributive *and* regulatory policy preferences. Also counter to expectations, the uncontrollable attribution message led to *greater* support for the regulatory policies. An examination of the effects of the controllability attribution manipulation for each regulatory policy item revealed that the observed effects were driven by the policy measures that pertained to genetic testing to aid in personalized medicine; so, it was perhaps not surprising that exposure to the uncontrollable attribution (genetic) message resulted in greater support for these regulatory policies requiring genetic testing of patients. Another unanticipated finding was that causal attributions failed to mediate the relationship between controllability attributions and policy preferences; however, there was evidence of a direct effect of causal attributions on policy preferences. As would be expected, greater agreement with the external causal items for heart disease led to greater support for distributive, or supportive, policy measures.

Racial cues were also shown to influence participants' health policy opinions. Intergroup racial cues interacted with controllability attributions such that support for the

---

<sup>35</sup> Perhaps the only exception to this finding was among the small number of highly educated participants (e.g., those with professional or doctorate degrees), whom tended to be less favorable toward the regulatory policy measures than the supportive policy measures.

health/science policies was overall lowest among participants in the controllable attribution and out-group racial cue group. Intergroup racial cues also influenced audiences' distributive policy opinions; as predicted, participants exposed to an in-group racial cue were substantially more supportive of the distributive policies, regardless of respondent race. Yet, the intergroup racial cue did not affect respondents' regulatory preferences. With regard to the background variables, education was not shown to moderate the effects of the experimental manipulations on the policy measures, but racial attitudes moderated the observed effects, producing an interesting interaction effect of racial attitudes by respondent race for participants' policy preferences.

### **Post Hoc Analyses**

Based on the observed moderating effects of racial attitudes on audiences' responses to the experimental message manipulations, post hoc analyses were conducted to examine the potential moderating effects of other values with political ideology being a prime target. Research shows that political ideology has important implications for the public's policy opinions regarding various social and racial issues (e.g., Bobo, 1988; Page & Shapiro, 1992). Differences in policy preferences by political ideology may reflect inherent value differences among Americans. Studies reveal that differences in policy opinions by party and ideology vary by issue but are persistent and sometimes large (Page & Shapiro, 1992). The influence of value predispositions on public opinion and support for advances in genetics and personalized medicine is certainly an important avenue of research. Studies indicate that political ideology has the capacity to influence public support for new developments in health and science, such as human embryonic

stem cell research (Ho, Brossard, & Scheufele, 2008; Nisbet, 2005). Given the correlations between political ideology and certain outcome measures in this study, exploration of the ideological predisposition was warranted (refer to Table 8.5).

To examine whether political ideology moderated the effects of the stimulus messages on opinions about personalized medicine, causal attributions, and health policy preferences, ANOVA models were run predicting each outcome variable by political ideology (coded as Conservative (1), Moderate (2), and Liberal (3)), respondent race, each experimental condition (controllability attribution and intergroup racial cue), and the two-way interactions between ideology and each of the experimental conditions. Corrections for experiment-wise error were performed using Tukey's test (i.e., reducing Type I error rates) (Field, 2005).

Results showed that political ideology moderated the effects of the experimental manipulations on participants' distributive policy preferences and regulatory policy preferences. Firstly, there was a statistically significant interaction effect of political ideology by message controllability attribution for participants' distributive policy preferences ( $F(2, 1357) = 6.17, p < .01$ ). Figure 8.5 depicts the interaction effect of political ideology by message controllability attribution for participants' distributive policy preferences. As might be expected, across treatment conditions Liberals were most supportive of the distributive policies.<sup>36</sup> Across treatment groups, support for the

---

<sup>36</sup> In the controllable attribution condition, there was a statistically significant effect of political ideology for distributive policy preferences ( $t(526) = -3.80, p < .001$ ), such that Conservatives were least supportive of the distributive health policies ( $M = 3.02, SD = .87$ ) and Liberals were most supportive ( $M = 3.32, SD = .91$ ). There was also a statistically significant effect of political ideology for distributive policy preferences in the

distributive policy measures was lowest among Conservatives in the controllable attribution (behavioral) group, and highest among Liberals regardless of their assignment to the message controllability treatment condition. Among Conservatives, there was a statistically significant effect of message controllability attributions for distributive policy preferences ( $t(420) = 3.54, p < .001$ ), such that support was lowest among those in the controllable attribution group ( $M = 2.64, SD = .95$ ) and highest for those in the uncontrollable attribution group ( $M = 2.98, SD = .87$ ). Moreover, the interaction effects involving political ideology and message controllability attribution on distributive policy preferences remained statistically significant after controlling for participants' education, racial attitudes, attention to news about science/health, and knowledge about genetics.

Much like episodic framing, the controllable attribution (behavioral) message frame seemed to prompt Conservatives to oppose the distributive policy measures. The controllable attribution message may have led Conservatives to blame individuals for their health problems, thereby diminishing their support for the policy measures intended to improve patients' health and medical treatment. Overall, the results suggest that the effects of controllability attributions were particularly influential among Conservatives, who were predisposed to oppose such measures and tended to react negatively to message framing that emphasized the controllable nature of health risks for heart disease.

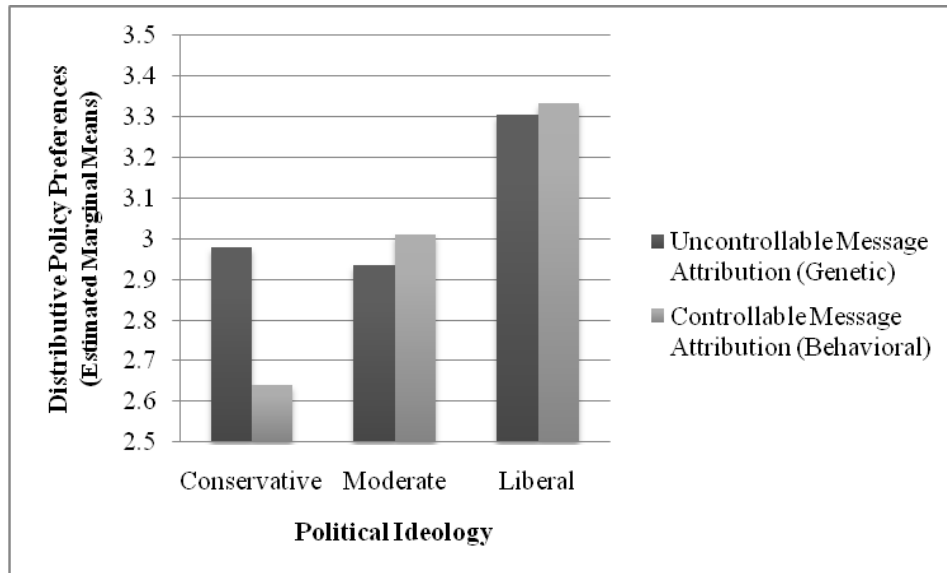
---

uncontrollable attribution group ( $t(547) = -7.64, p < .001$ ); once again, Conservatives were least supportive of the distributive policy measures ( $M = 2.70, SD = .95$ ) and Liberals were most supportive ( $M = 3.34, SD = .94$ ).



Figure 8.5.

Interaction Effect of Controllability Attribution and Political Ideology on Distributive Policy Preferences

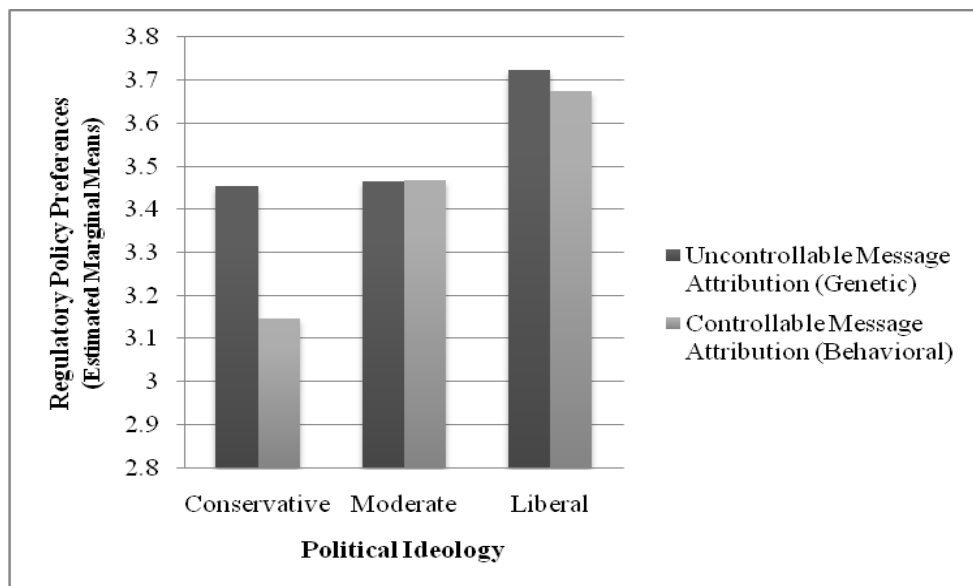


The post hoc analyses also revealed a statistically significant interaction effect of political ideology by controllability attribution for participants' regulatory policy preferences ( $F(2, 1357) = 4.10, p < .05$ ). Figure 8.6 depicts the interaction effect of political ideology by controllability attribution for participants' regulatory policy opinions. Among Conservatives, there was a statistically significant effect of message controllability attributions for regulatory policy preferences ( $t(392.89) = 3.42, p < .01$ ), such that support for the regulatory measures was lower among those in the controllable attribution group ( $M = 3.15, SD = .95$ ) and higher for those in the uncontrollable attribution group ( $M = 3.45, SD = .80$ ). Similar to the distributive policies, message framing that emphasized the controllable nature of heart disease risk led Conservatives to express less policy support. As before, Liberals were more favorable toward the regulatory policies than Conservatives, regardless of Liberals' experimental treatment

condition.<sup>37</sup> The results indicate that Liberals failed to differentiate between the two classifications of health policy, and generally expressed greater support for the policy measures than Conservatives. However, Conservatives responded *more* negatively to the health/science policies following exposure to controllable attribution (behavioral) message, as compared to the uncontrollable attribution (genetic) message. Once again, the interaction effects involving political ideology and message controllability attribution remained statistically significant after controlling for education, racial attitudes, attention to news about science/health, and knowledge about genetics.

*Figure 8.6.*

Interaction Effect of Controllability Attribution and Political Ideology on Regulatory Policy Preferences



<sup>37</sup> In the controllable (behavioral) group, there was a statistically significant main effect of political ideology for regulatory policy opinions ( $t(526) = 3.45, p < .01$ ), such that support for the policies was highest among Liberals ( $M = 3.72, SD = .76$ ) and lowest among Conservatives ( $M = 3.14, SD = .95$ ). There was also a statistically significant effect of ideology for regulatory policy preferences in the uncontrollable (genetic) group ( $t(369.91) = -6.63, p < .001$ ), such that support for the policies was highest among Liberals ( $M = 3.67, SD = .82$ ) and lowest among Conservatives ( $M = 3.14, SD = .95$ ).

## *Summary*

Overall, this study provided evidence to suggest that intergroup racial cues and controllability attributions in media messages impact public opinion about personalized medicine, causal explanations for heart disease, and health/science policy preferences. Counter to expectations, however, the message manipulations did not produce strong interaction effects on opinions about personalized medicine nor related health policy preferences. In some cases, participants in the uncontrollable attribution/out-group racial cue group were shown to have less favorable opinions and less support for health policies, but the effects were generally small. Yet, each of the message features (controllability attributions and intergroup racial cues) had notable main effects on several outcome variables in this study.

Thus far, I have presented the results of the experimental manipulations separately for each outcome measure in this study. In order to summarize the effects of the stimulus messages in the context of several associated outcomes, ordinal least squares regression models were run predicting audiences' causal attributions for heart disease and health policy preferences. The regression models included the two message manipulation factors, all four types of causal attributions for heart disease (internal/external and general/specific), as well as controls for several demographic variables (gender, age, race, income, and religion). Figure 8.7 summarizes the results of these regression models. As shown on the figure, the message controllability attribution manipulation had a statistically significant effect on regulatory policy preferences after controlling for demographics, intergroup racial cue group, and causal attributions for heart disease. As

previously discussed, the uncontrollable message attribution did not influence distributive policy opinions and *positively* influenced regulatory policy opinions.

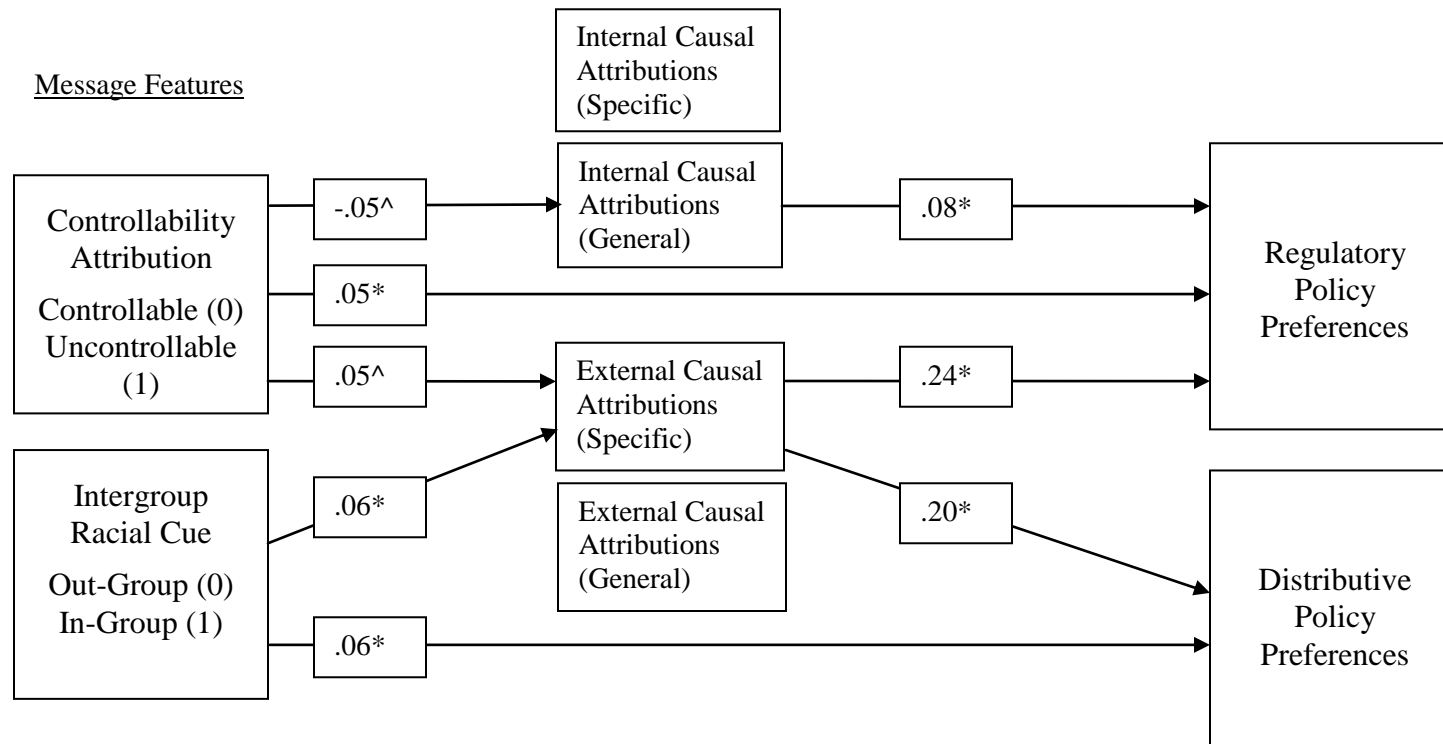
The analyses for H1a provided an explanation for the observed effects of message controllability attribution for participants' regulatory policy preferences; an examination of the individual regulatory policy measures revealed that the uncontrollable attribution message (regarding genetic risk factors for heart disease) significantly increased support for the regulatory policy measures that required genetic testing to aid in medical treatment. The results therefore indicate that framing heart disease as an uncontrollable, genetic-related health risk led to greater support for policies that promote genetic testing to provide personalized medicine; as such, participants' support for these policies may be reasonably interpreted as support *for* personalized medicine and genetic testing. With regard to causal attributions, the controllability attribution manipulation had a statistically significant effect (using a one-tailed test) on audiences' internal causal attributions (general) and external causal attributions (specific); as expected, an uncontrollable message emphasizing the genetic risk factors for heart disease led participants to make fewer internal causal attributions and more external causal attributions for heart disease.

Figure 8.7 also shows that the intergroup racial cue message feature significantly influenced participants' distributive policy preferences after controlling for demographic variables, message controllability attribution, and causal attributions for heart disease. As predicted, an in-group racial cue increased participants' support for the distributive policy measures. An in-group racial cue message also led audiences to make more external causal attributions (specific). Yet, counter to expectations, intergroup racial cues did not

influence participants' internal causal attributions for heart disease. In other words, priming in-group versus out-group racial status did not affect people's judgments about internal causal attributions, but did influence their specific external causal explanations for heart disease. The results also reveal that internal causal attributions (general) and external causal attributions (specific) significantly influenced participants' health policy opinions, above and beyond the effects of the other types of causal attributions.

Figure 8.7.

Summary of Results of Regression Models Predicting Respondents' Causal Attributions for Heart Disease and Health Policy Preferences.



Note. For all  $\beta$  coefficients:  $*p < .05$ ,  $^{\wedge}p < .10$ .

Note. Model includes controls for demographic variables (age, gender, race, income, and religion).

## ***Conclusion***

In sum, this study assessed the ways that intergroup racial cues and controllability attributions in health messages influence public opinion about personalized medicine, heart disease, and health/science policy preferences. The findings suggest that the public's opinions and policy preferences may be influenced by intergroup racial cues and attributions in media messages. This research connects literature on racial priming and intergroup attributions by examining the differential effects of *intergroup* racial cues on health opinions and policy preferences among Whites and African Americans. There was evidence to suggest that intergroup racial cues influenced audience's opinions about personalized medicine and related health policy preferences. As expected, an in-group racial cue led to more favorable opinions about personalized medicine and greater support for the distributive policy measures.

The results are supported by a substantial body of research on intergroup attributions and the ultimate attribution error, which has shown that the mere classification of people into in-group and out-group categories is sufficient to initiate bias toward one's own in-group (e.g., Gaertner & Dovidio, 2005; Chatman & von Hippel, 2001). Research in this area has revealed that attributions at the group level are often ethnocentric and group-serving, as individuals tend to favor members of their own group rather than members of out-groups. This bias, labeled the ultimate attribution error (or group attribution error), has been replicated in a variety of contexts over the past three decades (Allport, 1954; Pettigrew, 1979; Allison & Messick, 1985; Islam & Hewstone, 1993; Taylor & Jaggi, 1974; see also Hewstone, 1990, and Kenworthy & Miller, 2002).

The findings from this study provide support for the ultimate attribution error in the context of messages about genetics, race and medicine. Interestingly, among African Americans, an in-group racial cue also appeared to diminish concerns about discrimination as a consequence of personalized medicine. Thus, in addition to providing support for the idea that in-group cues lead to biases in favor of one's own group, the study also revealed that in-group racial cues may minimize concerns about new advances in medicine for minority racial groups. Perhaps by exemplifying how personalized medicine may benefit people like them, the in-group racial cue lowered concerns among African Americans about limits on access to medical treatment and discrimination against people that are less responsive to medical treatment.

However, there was limited evidence to suggest that intergroup racial cues influenced participants' causal attributions for heart disease. It is possible that the controllability attribution manipulation was more powerful than intergroup racial cues in guiding audience's causal attributions for heart disease. Moreover, participants' causal attributions for heart disease may have been more established and resistant to change, since the majority of Americans probably have pre-existing opinions about important risk factors for heart disease. In contrast to respondents' well-established opinions about heart disease, nascent opinions about topics such as personalized medicine and genetics may be more likely to reveal the effects of intergroup racial cues in media messages. Perhaps it is therefore not surprising that the effects of intergroup racial cues were less perceivable for participants' causal attributions than for opinions about personalized medicine and related health policies.



The study also showed that message framing emphasizing either controllable or uncontrollable risk factors for disease affected audience's causal attributions and policy preferences. An uncontrollable attribution message focusing on genetic factors for disease led audiences to make more external causal attributions and fewer internal causal attributions for heart disease, as compared to a controllable attribution message focusing on behavioral risk factors. The effects of controllability message framing on causal attributions are important because research has shown that when people identify individual behaviors as the cause of a problem or issue, they attribute responsibility to address the issue to the individual, yet when people identify external or uncontrollable factors as the cause, they are more likely support social/governmental responsibility or interventions to remedy the problem or issue (e.g., Kinder & Sanders, 1990, 1996; Dovidio & Gaertner, 1981). The results provided some support for this premise, as external causal attributions for heart disease were shown to increase audience's distributive policy preferences.

Whereas this study showed that controllability message framing had a direct effect on general causal attributions and regulatory policy preferences, there was no evidence of a mediational effect via causal attributions or a direct effect on distributive policy preferences. The absence of mediational effects may have resulted from a lack of correspondence between the subject of the causal attribution measures and policy measures; the causal attribution items focused exclusively on opinions about heart disease, but the policy measures addressed a broader range of topics, including support for medical research in personalized medicine and the development of medical drugs for

specific racial groups. Perhaps had the subject matter of the two categories of measurement been more closely aligned, a meditational effect might have been found. With regard to the absence of a direct effect of the controllability manipulation on distributive policy preferences, it is possible that the regulatory policy measures, namely the policies that required genetic testing to provide personalized medicine, did a better job of capturing differences in audience's policy opinions as a consequence of the controllability message framing.

More generally, the findings indicated that participants typically failed to differentiate between the distributive and regulatory policy measures in this study. Based on Lowi's (1964) policy typology, the distributive, or supportive, policies were designed to capture participants' support for personalized medicine and their interest in promoting advances in this area of medical research and treatment. The regulatory, or discriminatory, policies were designed to measure participants' preference for limitations on personalized medicine or increased government regulation of new medical treatments and scientific research related to personalized medicine and genetics. In hindsight, it seems likely that some of the regulatory policy measures, particularly those requiring genetic testing and health insurance coverage for genetic testing, may have been reasonably interpreted as a means of *promoting* personalized medicine via genetic testing. Although the regulatory measures had high ecological validity in that they represented plausible and realistic policies, they may not have emphasized integral characteristics of Lowi's typology, such as the regulation of individuals' conduct through obligation or punishment. It is fair to say that there was a trade-off between realism and adherence to

policy typology that may have resulted in a blurring of the line between regulatory policies and distributive policies in this study.

Individual differences moderated the effects of controllability attributions and intergroup racial cues on people's opinions about personalized medicine and related health policy preferences. Although education did not moderate the effects of the stimulus messages, participants' pre-existing racial attitudes interacted with the controllability attribution and intergroup racial cue to condition audience's responses to the stimulus messages. The study revealed that racial attitudes interacted with message controllability attributions to moderate respondents' degree of favorability toward personalized medicine. These results are in line with previous research that has shown that self-reported racial attitudes or racial prejudice can influence people's perceptions of racial progress and race-relevant topics or policies (Amodio, Devine, & Harmon-Jones, 2008; Brodish, Brazy, & Devine, 2008).

In some cases, participants that favored their racial out-group and those that strongly favored their racial in-group appeared to react to the stimulus messages in a similar manner, but the underlying reasons for the observed pattern of effect may be quite different between the two groups of participants. Respondents that favored their racial out-group may have taken issue with the idea that health disparities could be associated with genetic differences across racial groups; for these participants, the uncontrollable attribution (genetic) message may have heightened concerns about discrimination as a consequence of linking genetics and race with health status. In contrast, participants that strongly favored their racial in-group may have questioned the idea that health disparities

could be associated with factors outside of a person's control; for these participants, the controllable attribution (behavioral) message may have been more consistent with their underlying social stereotypes (e.g., that some types of people are inherently lazy or unhealthy). This rationale is supported by the fact that controlling for audiences' beliefs about the credibility of the stimulus messages made the interaction effect between controllability attributions and racial attitudes non-significant.

Intergroup racial cues also interacted with racial attitudes to moderate participants' favorability toward race-targeted medical care and support for distributive policies. In general, participants reported more favorable opinions and distributive policy preferences following exposure to an in-group racial cue, rather than an out-group cue, especially among participants that favored their racial in-group. With regard to opinions about race-targeted medical care, the greatest mean difference by racial cue group was observed for respondents that strongly favored their racial in-group; those that received an in-group racial cue were substantially more favorable toward race-targeted medical care than their counterparts in the out-group racial cue group. A similar pattern of effects was observed among participants that favored their racial in-group for the distributive policy measures. However, participants that favored their racial out-group also responded more positively to the distributive policies following exposure to an in-group racial cue, as compared to an out-group racial cue. Interestingly, the moderating effect of intergroup racial cue and racial attitudes on opinions about race-targeted care and distributive policy preferences was greater for African Americans. Perhaps by reducing concerns among African Americans about discrimination as a consequence of

personalized medicine, the in-group racial cue led these participants to express more supportive opinions and policy preferences.

Political ideology was also shown to moderate the effects of the stimulus messages on audience's policy preferences. Post hoc analyses showed that political ideology and controllability attributions moderated the effects of the stimulus messages on audience's distributive and regulatory policy preferences. As might be expected, Liberals were overall most favorable toward the policy measures and Conservatives were least favorable. The controllability message feature appeared to have the greatest effect on Conservatives; those that received a controllable attribution message expressed less support for the distributive and regulatory policies than their counterparts in the uncontrollable attribution group. Similar to the effects of episodic framing, the controllable attribution frame may have led Conservatives to blame patients for their health problems, thereby reducing support for the health/science policies. The uncontrollable attribution message may have functioned like a thematic message frame that guided Conservatives to consider risk factors for disease that are outside of a patients' control, therefore resulting in greater support for the health policy measures. Overall, the results suggest that controllability attributions may influence policy opinions via judgments of responsibility, particularly among those that are predisposed to oppose such policies.

In sum, this research contributes to a burgeoning body of literature on public opinion about genetics, race, and health. The study extends research in this area by examining the effects of message attributions and intergroup racial cues on public

attitudes and policy preferences. Although the literature offers support for the idea that controllability attributions and racial cues influence people's policy opinions as a consequence of attributional processes, very few studies thus far have examined these issues in the context of genetics, personalized medicine, and heart disease. This study indicates that attributions and intergroup racial cues in media messages are important ingredients in shaping public opinion and policy preferences regarding genetics and personalized medicine. The results demonstrated that news media framing may impact public opinion on issues related to genetics, personalized medicine and heart disease, as well as related policy measures. As Jacoby (2000) notes, framing can have powerful effects on the determinants of attitudes toward policy issues; framing can induce self-interest effects among people who benefit from certain policies, or reduce interest among those that may not directly benefit. Moreover, perceptions about the reasons for illness and health disparities, and by extension, who or what is responsible to ameliorate them, are important factors for public acceptance of policy strategies to address health disparities (Gollust, 2008).

Over the past decade, a great deal of effort has been put forth to identify strategies to communicate in ways that increase the public's confidence in their ability to adopt healthy behaviors and their confidence in the efficacy of medical recommendations, but more support is needed to study the best means of communicating information about genetics and health to the public (Parrott, Silk, & Condit, 2003). Studies have only begun to address the numerous ways that message framing may influence public opinion about genetics, personalized medicine, and health, and relatively little is known about the

effects of such messages on health behavior. This research provides evidence to suggest that tailoring messages to particular racial/ethnic groups may minimize distrust among minority racial groups, which may ultimately result in positive health behaviors and outcomes. As progress in the field of genetics and personalized medicine continues to occur at a rapid pace, it is important to consider how mass media coverage of these medical advances shapes public attitudes and behaviors, as well as health/science policy opinions. Research on the effects of health messages about genetics and race constitutes an important first-step toward identifying the best methods for communicating information about these complicated but crucial topics to the public at large.

## **CHAPTER NINE: CONCLUSION**

Scientific progress related to genetics and health is an important area of research for communication scholars. Medical biotechnology, encompassing genetics, genomics, and health, is an emerging topic within the field of communication (Chow-White, 2009; see also Slack, 2005). Modern scientific progress related to genetics has been accompanied by growing scholarly concern about the social and ethical consequences of such advances. One area of concern that merits more empirical research is the impact of messages linking genetic traits with racial/ethnic differences. Certainly, new discoveries on genetic traits and genetic health risks among racial or ethnic groups can impact public opinion and health policy preferences. It is therefore important to consider the implications of developments in science and medicine, including the ways in which messages about genetics and race might inadvertently foster greater social inequality and exacerbate health disparities among minority racial/ethnic groups.

Currently, the appropriateness of using race as a surrogate for genetic similarity in medicine and public health is being debated (e.g., Cooper, Kaufman, & Ward, 2003; Burchard, Ziv, & Coyle, et al., 2003). The issue is particularly important in the context of racial and ethnic disparities that exist in health and healthcare in America (e.g., Armstrong, Hughes-Halbert, & Asch, 2006; Cooper, Kaufman, & Ward, 2003). Media coverage about health disparities and genetic differences among racial/ethnic groups has the potential to influence public opinion and health policy preferences. Since the news media will likely continue to be an integral source of information about health and



science for the public, it is important to understand the factors that influence how media reports about genetics are generated (Geller, Bernhardt, & Holtzman, 2002) and the impact of media framing on public attitudes and discourse about genetics, race, and medicine.

### ***Summary of Results***

This dissertation set out to examine the influence of messages about genetics, race, and health on public opinion about personalized medicine and health policy. The research examined the effects of message attributions and racial cues on audience's opinions about current health topics and policies related to genetics and medicine. Three studies were conducted to examine the impact of message framing on audiences' beliefs about personalized medicine, race-targeted medical care, and related health/science policies. Although the literature indicates that message features such as racial cues and controllability attributions may impact public opinion and health policy preferences as a consequence of intergroup biases and causal attributional processes, few studies to date have examined these issues in the context of genetics and personalized medicine.

The results of this dissertation reveal that messages about genetics and race can have important consequences for Americans' beliefs and attitudes regarding developments in science and medicine. This research provides evidence to suggest that racial cues and controllability attributions in health messages affect the public's concern about and support for personalized medicine and genetic testing and research. Intergroup biases interacted with message content to influence opinions about personalized medicine, race-targeted medical care, genetic testing, and related health policies. The

results provide evidence to suggest that self-interest is an important explanatory factor in the effects of message framing and intergroup attributions on public opinion about genetics and personalized medicine. This research also indicates that the effects of messages about genetics, race, and health may be conditioned by relevant background variables, such as education, political ideology, and racial attitudes.

#### *Racial Cues and Respondent Race*

The pilot study (Study 1) offered preliminary evidence to suggest that racial cues in messages about genetics and personalized medicine may have differential effects on opinions among Whites and African Americans. The pilot study showed that prior to receiving a racial cue message, Whites were more favorable toward personalized medicine (or genetically targeted care) than African Americans; after exposure to a racial cue stimulus message, Whites expressed significantly more negative judgments about using race to provide personalized medicine, as compared to African Americans. Yet, the small sample size and within-subjects design of the pilot study restricted the researcher's ability to attribute the racial differences in opinion to the racial cue stimulus message.

Study 2 built on the findings from the pilot study by examining the between-subject effects of messages containing racial cues on opinions about personalized medicine and race-based medicine. Study 2 showed that the differences in opinion between Whites and African Americans were not as large as the results of the pilot study suggested. Whereas Study 1 offered preliminary evidence of racial differences in opinion about genetics and personalized medicine in response to messages about personalized medicine and race-based medicine, the results of Study 2, which employed a larger and

more representative sample of participants, revealed fewer differences in responses to the stimulus messages across racial groups. By employing a between-subjects experimental design, Study 2 provided more convincing evidence regarding comparisons of participants' responses to racial cues in messages about genetics and personalized medicine. The between-subjects design was necessary to test whether the presence or absence of racial cues in messages have differential effects among Whites and African Americans. In general, participants across both racial groups tended to prefer messages about personalized medicine and genetics that were individualized rather than 'racialized.' The results from the larger, representative sample in Study 2 suggest that messages about genetics that contain a generalized race cue, which denotes neither in-group nor out-group racial status, have similar effects on audience's favorability toward personalized medicine regardless of racial identification.

Consistent with the pilot study, Whites at the outset of Study 2 were more favorable toward personalized medicine than African Americans; but unlike the pilot study, there was no evidence of a change in opinion among Whites following exposure to the racial cue stimulus message. Counter to expectations, respondent race did not moderate the effects of the racial cue stimulus message on participants' favorability toward personalized medicine in Study 2. Before and after exposure to the stimulus messages, Whites were more favorable toward personalized medicine than African Americans, regardless of treatment condition. The results indicate that the message effects were limited. The lack of an interaction effect of treatment group by respondent race in Study 2 may be partially explained by the fact that the general nature of the racial

cue message did not denote in-group or out-group racial status; the racial cue message may have thus failed to prime intergroup attributions, and as a consequence, did not substantially alter respondents' opinions about personalized medicine.

Yet, both Study 1 and Study 2 demonstrated that African Americans were more wary about new developments in genetics and personalized medicine than Whites. Taken together, the results of the two studies indicate that African Americans generally have greater concerns than Whites about discrimination and limits on access to medical treatment as a consequence of personalized medicine. Interestingly, the distribution of participants' concerns about personalized medicine by race was nearly identical at the beginning of Study 1 and Study 2. Whereas a majority of Whites in both studies were strongly in support of the idea that personalized medicine would improve people's overall medical care, African Americans were more divided regarding the relative merits and harms associated with personalized medicine. The results provide convincing evidence to suggest that African Americans maintain a greater sense of ambivalence than Whites about modern progress in the fields of genetics and personalized medicine.

More generally, Study 1 and Study 2 revealed that communications about medical advances related to genetics and personalized medicine may raise issues of trust and acceptance among minority racial/ethnic groups. These findings are supported by past research that has shown that minority groups tend to be more concerned about discrimination and abuses stemming from genetic testing and genetics research (e.g., Zimmerman, et al., 2006; Thompson, et al., 2003). The past history and experiences of minority groups with regard to eugenics and racial prejudice likely augment their

concerns about new developments in medicine and genetics. Apprehension about medical genetics introducing new forms of racial prejudice are certainly warranted, since beliefs in genetic variation among different races are routinely used by racist elements as evidence in favor of discriminatory programs or against programs that ameliorate historical and structurally based discrimination (Condit & Bates, 2005, p. 98). It is important to recognize that media messages cueing race in the context of medicine and health may heighten such concerns among minority racial and ethnic groups.

#### *Intergroup Racial Cues and Attributions*

Study 3 demonstrated that intergroup racial cues and attributions in media messages influence audience's opinions about personalized medicine, race-targeted medical care, and related policy preferences among both Whites and African Americans. Whereas Study 1 and Study 2 provided evidence to suggest that racial cues in messages about genetics influence public attitudes and beliefs, the studies did not examine the effects of *intergroup* racial cues and controllability attributions in health messages. Study 3 built on the earlier studies by examining the differential effects of intergroup racial cues; the study showed that in-group racial cues led to more favorable opinions about personalized medicine and greater support for distributive policy measures among both Whites and African Americans. The findings indicate that self-interest plays a consequential role in shaping public opinion about new advances in genetics, health and personalized medicine.

Study 3 also revealed that in-group racial cues may have the capacity to mitigate concerns about new developments in genetics and personalized medicine among minority

racial groups. An in-group racial cue message appeared to diminish concerns among African Americans about discrimination stemming from personalized medicine and genetic testing. Perhaps by exemplifying how personalized medicine may benefit people like them, the in-group racial cue lowered concerns among African Americans about limits on access to treatment and medical discrimination. Taken together, the results indicate that intergroup racial cues may level the playing field with regard to public opinion about personalized medicine. In general, both Whites and African Americans tended to favor personalized medicine when their in-group status was primed in the stimulus message. African Americans, who may have been predisposed to have concerns about discrimination as a consequence of genetic testing and personalized medicine, were shown to have a reduction in such concerns following exposure to an in-group racial cue, as compared to an out-group racial cue. Intergroup racial cues were represented in the experimental messages as part of the press release's description of the results of clinical trials on a new hypertensive drug, which was reported to sharply lower the rates of heart disease among a racially-identified population.

Study 3, however, found little evidence to suggest that intergroup racial cues influenced participants' causal attributions for heart disease. It is possible that the controllability message manipulation was more powerful than the intergroup racial cue in guiding audience's causal attributions for heart disease. In addition, causal attributions for heart disease may have been more established and resistant to change, since the majority of Americans probably have pre-existing beliefs about the importance of various risk factors for heart disease. Nascent opinions about novel or unfamiliar topics, such as

personalized medicine and genetics, may be more prone to the effects of intergroup racial cues on audiences' opinions and beliefs. Perhaps it is not surprising that the effects of intergroup racial cues were less consequential for participants' causal attributions for heart disease than for their opinions about personalized medicine and genetics, as well as related health/science policies.

### *Controllability Attributions*

Study 3 also found evidence that the public's opinions and policy preferences may be influenced by controllability attributions in media messages. The results showed that framing heart disease as the result of either controllable or uncontrollable risk factors affected audience's opinions about personalized medicine and race-targeted medical care, as well as health policy preferences. An uncontrollable attribution frame emphasizing genetic risk factors for heart disease led audiences to make more external causal attributions and fewer internal causal attributions for heart disease, as compared to a controllable attribution frame focusing on behavioral risk factors for the disease. The effects of controllability message framing on causal attributions for disease are consequential, because studies have shown that when people identify individual behaviors as the cause of a problem, they attribute responsibility to address the issue to the individual; when people identify external or uncontrollable factors as the cause, they are more likely support social/governmental responsibility or interventions to remedy the problem (e.g., Kinder & Sanders, 1990, 1996; Dovidio & Gaertner, 1981). Study 3 provided evidence to support this premise, as external causal attributions for heart disease were shown to increase audience's distributive policy preferences.

Message controllability attributions also influenced public support for health policies requiring genetic testing to aid in medical treatment. The uncontrollable attribution message about genetic risk factors for heart disease produced greater support for the health policies regarding genetic testing. Exposure to the uncontrollable frame presumably led participants to consider the potential benefits of genetic testing for the diagnosis and treatment of common diseases such as heart disease. Counter to expectations, however, message controllability attributions and policy preferences were not mediated by causal attributions. Instead, the message controllability manipulation directly affected audience's *general* causal attributions for disease; and audience's *specific* causal attributions for heart disease were shown to have a direct effect on distributive and regulatory policy preferences. While the general causal attribution items captured the effects of the controllability message manipulation on broad opinions about the causes of heart disease, the specific causal attributions measuring beliefs about the relative importance of particular risk factors for heart disease were more predictive of people's health policy preferences.

The absence of mediational effects may have resulted from a lack of correspondence between the targets of measurement for the causal attribution items and policy measures. Whereas the causal attribution items focused exclusively on heart disease, the policy measures addressed a broader range of topics, including participants' support for medical research in personalized medicine and the development of medical drugs for specific racial groups. It is possible that causal attributions may have mediated the effects of the controllability message framing on policy preferences if the subject



matter of the two categories of measurement had been more closely aligned. Ultimately, rather than provide evidence of mediational effects, the results showed that both message controllability attributions and specific causal attributions for heart disease had direct effects on health policy preferences.

#### *Moderating Effects of Background Variables*

This dissertation also demonstrated that the effects of messages about genetics, race, and health may be conditioned by relevant background variables such as education, political ideology, and racial attitudes. Study 1 and Study 2 revealed that education moderated the effects of stimulus messages on audience's concerns about the use of race to provide personalized medicine, or genetically targeted care. Both studies showed that the effects of a racial cue stimulus message were most pronounced among highly educated African Americans, who expressed the greatest degree of concern about genetically targeted care limiting people's access to medical treatment. African Americans with higher levels of education may have been more attuned to such concerns based on past experiences and knowledge about medical discrimination and eugenics, and the racial cue message may have heightened these concerns. The findings indicate that cueing race in the context of genetics and medicine may augment African Americans' apprehension about discrimination in medicine, particularly among those with higher levels of education. Based on the Study 3 results, however, it is reasonable to consider that an in-group racial cue may mitigate these message effects by education for African Americans' concerns about genetic testing and personalized medicine.

By employing a larger, more representative sample, Study 2 also showed that the moderating effects of education are in some ways consistent across racial groups. The study found that education interacted with the racial cue message to moderate participants' favorability toward genetically targeted care as a good way to personalize medicine, regardless of respondent race. Across racial groups, more highly educated participants were less favorable toward genetically targeted care following exposure to the racial cue stimulus message than their counterparts in the non-racial cue condition. Presumably, people with higher levels of education possess more complex heuristics regarding genetics and medicine, and the racial cue message may have primed their concerns about eugenics and discrimination as a consequence of using race to provide genetically targeted care.

Although the pilot study findings suggested that political ideology moderated the effects of a racial cue stimulus message on opinions about personalized medicine, Study 2 did not find evidence of an interaction effect involving political ideology. It is possible that the racial attitudes measure introduced in Study 2 was more successful than political ideology in capturing the moderating effects of pre-existing attitudes on opinions about genetically targeted care. Although participants' racial attitudes and political ideology were correlated, the magnitude of the relationship was not large ( $r = .11, p < .001$ ). Study 2 did reveal that political ideology had a direct effect on people's opinions about personalized medicine and genetic testing. As would be expected, Liberals tended to agree more strongly that genetically targeted care is a good way to personalize medicine, that personalized medicine would benefit people like them, and that it is a good idea to

get a genetic test to find out how well a person will respond to medical treatment.

Furthermore, based on the results of Study 3, it is possible that political ideology may have been shown to interact with the experimental treatment had controllability message framing been included in Study 2.

Study 3 showed that political ideology moderated the effects of message controllability attributions on health/science policy opinions. Political ideology interacted with the controllability attribution framing to moderate the effects of the stimulus messages on audience's distributive and regulatory policy preferences. As might be expected, Liberals were overall most favorable toward the health policy measures and Conservatives were least favorable. Consistent with the earlier study results, the message manipulations were shown to have the greatest effects on Conservatives. Overall, the findings showed that Conservatives were less supportive of health/science policies following exposure to a controllable attribution message, as compared to an uncontrollable attribution message. Similar to episodic framing, the controllable attribution message frame may have led Conservatives to blame patients for their health problems, thereby reducing support for related health policies. The uncontrollable attribution message appeared to function like a thematic frame in guiding Conservatives to consider the risk factors for heart disease that are outside of a patients' control, thereby producing greater support for the health policy measures. The results suggest that controllability attributions in media messages influence policy opinions via judgments of personal responsibility, particularly among those people that are predisposed to oppose such health policies.

With regard to racial attitudes, Study 2 and Study 3 provided evidence to suggest that pre-existing racial attitudes moderated the effects of messages about genetics, race and health on audience's opinions about personalized medicine. Study 2 indicated that racial attitudes conditioned the effect of a racial cue stimulus message on participants' opinions about whether personalized medicine would benefit people like them. However, additional analyses indicated that the observed effect was fairly weak, as the only statistically significant difference between treatment groups was among participants that slightly favored their racial in-group. The interaction effects of racial attitudes were more robust in Study 3, which found evidence that racial attitudes moderated the message effects on people's opinions and policy preferences. The study showed that participants that favored their racial in-group were generally more favorable toward personalized medicine following exposure to an in-group racial cue. As in Study 2, Study 3 revealed that the largest mean differences by racial cue group were among respondents that favored their racial in-group; those that received an in-group racial cue were substantially more favorable toward race-targeted medical care and more supportive of distributive health policies. Interestingly, the moderating effects of intergroup racial cues and racial attitudes on opinions about race-targeted medical care and distributive policy preferences appeared to be greater for African Americans in Study 3. Perhaps by reducing concerns about discrimination as a result of personalized medicine, the in-group racial cue led African Americans that strongly favored their racial in-group to express substantially more favorable opinions and distributive policy preferences.

The moderating effects of racial attitudes on public opinion and policy preferences are in keeping with research that has shown that self-reported racial attitudes or racial prejudice can influence people's perceptions of social progress and race-relevant topics or policies (Amodio, Devine, & Harmon-Jones, 2008; Brodish, Brazy, & Devine, 2008). More generally, the results of the background variables support prior research that has shown that individual differences such as political ideology and racial attitudes can impact attitudes about various issues (e.g., Shelton, 2005; Gilliam & Iyengar, 2000; Dovidio & Gaertner, 1998; Pan & Kosicki, 1996). Whereas a substantial amount of research in this area has focused on the effects of Whites' racial attitudes on opinions and policy preferences, this research contributes to the literature by considering the effects of *intergroup* racial attitudes for *both* Whites and African Americans on public opinion and health policy preferences.

### ***Limitations and Directions for Future Research***

While this dissertation research puts forward several interesting findings, there are research limitations that are worth noting. Some limitations present new directions for future research in this area. One concern pertains to the administration of the experimental studies. The online nature of this research meant that respondents had the ability to participate in the studies in a range of settings outside of a laboratory environment. Respondents may have participated at any time of day or night and at any location, such as home, work, or a public space; and they may have been subject to external distractions or interruptions as they participated in this research. A related concern is that participants' exposure to the stimulus messages could not be monitored or

ensured since the research was not conducted in a laboratory setting. However, any differences in environment and exposure would presumably have been randomly distributed across experimental conditions. In addition, timing data and message recall questions provided the researcher with a reasonable way to assess whether participants attuned to the press release stimulus messages. Moreover, the online nature of this experimental research offered the benefit of a more natural and externally valid setting than a traditional laboratory environment. Another benefit of the research design is that, unlike many online studies, the sample of participants was not limited to computer users, since those without access to computers and the internet were provided with a Web TV appliance in their home; this allowed for the recruitment of a more diverse sample of research participants.

An additional limitation associated with the experimental design is that forced exposure to the stimulus messages may have obscured the role of motivation and interest in media coverage about health and genetics. However, the literature indicates that the mass media constitute popular sources of health and science news. Studies have shown that over half of all Americans consider the news media a primary source of information about science and health (Brodie et al., 2003). Research has also revealed that a substantial portion of Americans report exposure to media coverage of genetics-related events (Geller, Bernhardt, & Holtzman, 2002). Furthermore, the nature of the data for this research allowed the researcher to examine and control for several correlates of interest and motivation, such as attention to news about science and health and knowledge about genetics. Future studies may examine the direct effects of personal

differences such as motivation and interest in news about science and health on public attitudes toward genetics and race, as well as related policy opinions.

Lastly, it is worth noting that some of the results of this research were relatively small in effect size. However, since the experimental treatments were generally brief and the message manipulations were subtle, the statistically significant differences in opinion across groups are still noteworthy. Moreover, as a new area of research inquiry, effect sizes are generally expected to be small (Cohen, 1988). Since genetics and personalized medicine are burgeoning and complex topics, it is reasonable to expect that these somewhat small differences in opinion may translate into larger differences as the public gains greater familiarity with the subject matter and as media coverage of these topics increases. Future research may examine the effects of repeated or overtime exposure to media messages about genetics, race, and health. According to cultivation theory, cumulative exposure to media content is the principal means by which the mass media exert influence on audiences (Gerbner & Gross, 1976; Gerbner, Gross, Morgan, & Signorielli, 1986). It is reasonable to expect that the observed effects might increase as a consequence of exposure to multiple health messages related to genetics and race over a longer period of time.

Despite its limitations, this research design maintained several notable strengths. Employing experimental research methods allowed for causal inferences to be made regarding the effects of media exposure to health messages about genetics and race on public opinion and policy preferences. The experimental design permitted an examination of the alternate pathways of effect from intergroup racial cues and

controllability attributions to causal attributions for disease, opinions about personalized medicine and race-targeted medical care, and related health/science policy preferences. Moreover, the nature of the panel data allowed for prior measurement of several background variables (e.g., political ideology, racial attitudes, knowledge about genetics, attention to health/science news) to avoid any potential sensitizing effects of the background measures on the results of the experimental manipulations. In addition, the sample of American adults that participated in this research was more representative of the national population than the college-aged participants that are typically recruited for experimental research studies (refer to Appendix F for sample characteristics). Lastly, the ecological validity of the stimulus messages was improved upon by incorporating material from published news articles and press releases on medical advances related to genetics, race and health. A potentially interesting avenue for future research may be to study the prevalence of these types of messages in the larger media environment, including print, television, and online sources.

## ***Implications of Research Findings***

### *Theoretical Implications for Communication Research*

This dissertation contributes to the literature by drawing connections between several bodies of empirical research, including media framing, racial priming, and attribution research. The research connects literature on racial priming and intergroup attributions by examining the differential effects of intergroup racial cues in media messages on opinions and policy preferences among Whites and African Americans. Whereas the racial priming literature addresses the comparative effects of implicit versus



explicit racial cues in media messages, very few studies of racial priming have examined the comparative effects of in-group versus out-group racial cues for majority and minority populations. This dissertation provided evidence to suggest that intergroup racial cues influence audience's opinions about personalized medicine and related policy preferences. The results revealed that generic racial cues are not necessarily comparable to intergroup racial cues, which prime in-group or out-group racial status. Unlike generalized racial cues, intergroup racial cues allow the researcher to examine the comparative effects of racial cues for a target in-group and out-group among both majority and minority populations.

This research indicates that racial cues priming in-group status may in some respects function in a similar way for majority and minority populations. Regardless of the race of respondents, participants tended to be more favorable toward personalized medicine in the presence of an in-group racial cue. As expected, an in-group racial cue led to more favorable opinions about personalized medicine and greater support for health policy measures among both Whites and African Americans. Perhaps by lowering concerns about discrimination among minority participants, the in-group racial cue message may have had a leveling effect on public attitudes that minimized the previously observed racial differences in opinions about genetics and personalized medicine. This research therefore highlights for communication researchers the importance of the comparative effects of intergroup racial cues in media messages among majority and minority populations.

The findings of this dissertation also provide support for the literature on intergroup attributions and the ultimate attribution error, which has shown that the mere classification of people into in-group and out-group categories is sufficient to initiate bias toward one's own in-group (e.g., Gaertner & Dovidio, 2005; Chatman & von Hippel, 2001). Research in this area has revealed that attributions at the group level are often ethnocentric and group-serving, as individuals tend to favor members of their own group rather than members of out-groups. This bias, labeled the ultimate attribution error (or group attribution error), has been replicated in a variety of contexts over the past three decades (Allport, 1954; Pettigrew, 1979; Allison & Messick, 1985; Islam & Hewstone, 1993; Taylor & Jaggi, 1974; see also Hewstone, 1990, and Kenworthy & Miller, 2002).

This study is among the first to provide evidence for the ultimate attribution error in the context of messages about genetics and personalized medicine. In addition to providing support for the idea that in-group racial cues lead to biases in favor of one's own group, the study also revealed that in-group cues may diminish concerns about new advances in medicine among minority racial groups. By exemplifying how personalized medicine may benefit people like them, the in-group racial cue appeared to lower concerns among African Americans about personalized medicine limiting access to medical treatment and discriminating against patients that are less responsive to certain medical treatments. Undoubtedly, it is important to consider the social and ethical implications of this finding, as research has shown that media messages that label certain racial/ethnic groups as carriers of a disease may have adverse consequences for health behavior and broader social environments (Serretti & Artioli, 2006). Yet, these concerns

must be balanced against efforts to reduce health disparities by identifying ways to address minority groups' concerns and mistrust about modern advances in medicine.

This research also testifies to the importance of distinguishing between causal attributions and controllability attributions, which are oftentimes confounded in empirical studies on attributions (e.g., Reutter, et al., 2006). Certainly, many risk factors for disease may be conceptualized as internal or external, and controllable or uncontrollable. Although a person's genetic profile is internal in the sense that each person carries their own unique genetic makeup, the uncontrollable nature of genetics and family heredity led people to conceptualize genetic factors as external causal explanations for heart disease. This finding is important because research has shown that individuals are usually viewed as less responsible for their condition in cases of external and uncontrollable rather than internal and controllable attributions; and these responsibility judgments have implications for public policy preferences.

In addition, this study contributes to the attribution literature and health communication research by distinguishing between specific and general causal attributions for disease, and presenting empirical measures for each construct. Whereas general causal attributions were conceptualized as broad-based beliefs about the overarching causes of disease, specific causal attributions were designed to measure beliefs about the relative importance of particular risk factors for disease. With regard to general causal attributions, this dissertation suggests that framing a health risk as controllable (e.g., behavioral or lifestyle risk factors) leads audience's to make more internal causal attributions for disease, whereas framing a health risk as uncontrollable

(e.g., genetic or hereditary risk factors) results in more external causal attributions.

Specific causal attributions for disease, however, were shown to directly affect people's support for health policy measures.

Overall, the dissertation provides evidence to suggest that the way a health message is framed in terms of controllability attributions and intergroup cues has important consequences for opinions about personalized medicine and policy preferences. This finding is in keeping with prior research that has shown that message framing and attributions can affect the public's beliefs about social and health problems, as well as policies designed to address these issues (e.g., Iyengar, 1991). This research demonstrates that controllability attributions and racial cues in media messages have implications for the public's judgments about self-interest and responsibility regarding current health problems, as well as perceptions about who deserves to benefit from public health initiatives to remedy these problems. Based on the theoretical concept of moral inclusion-exclusion, individuals and groups are considered within the circle of moral inclusion when people feel a moral duty to assist them; those outside of the group, however, are excluded from the group's moral responsibilities (Staub, 1990; Tygart, 2000). Message features that highlight the uncontrollable nature of disease and prime in-group attributions may broaden the public's circle of moral inclusion in the health domain, and lead to greater support for public policy initiatives. These are important considerations for health communication researchers, as judgments about responsibility and moral responsibilities to assist others have been shown to increase public support for public health policies. This research provides evidence that attributions and intergroup

cues are consequential in shaping public opinion and health policy preferences. The ways in which the media influence citizens' beliefs about their responsibility to help others (or lack thereof) is an important area of health communication research, with consequences for public support for various public policies aimed at redressing existing health disparities.

### *Implications for Public Health and Medicine*

Perhaps it should be reassuring to scholars and public health practitioners that Americans, in general, prefer messages about personalized medicine and genetics that are individualized rather than 'racialized.' After all, race is an imprecise and potentially problematic proxy for genetic similarity, which has introduced a number of ethical and social concerns in the public sphere. Scholars express concern that race-based medicine may promulgate greater health disparities for minority racial and ethnic groups (e.g., Condit et al., 2004; Condit & Bates, 2005). Condit and Bates (2005) explain that if race-based medicine becomes a widely disseminated standard of care, it may exacerbate health disparities in two ways: 1. greater attention to biological differences along racial lines may further worsen the discriminatory treatment accorded by some medical personnel to members of minority groups, and 2. race-based medicine may increase the relatively high levels of distrust that minorities already hold toward the medical profession. However, "the potential of race-based medicine to increase health disparities in these ways depends on attitudes about race, and messages about genetics may shape these attitudes" (Condit & Bates, 2005, p. 98). This research indicates that the American public may be resistant

to race-based medicine and claims about inherent biological differences across racial/ethnic groups.

Evidence from this research therefore suggests that the public generally agrees with the ethical and social concerns voiced by scholars and medical practitioners regarding race-based medicine. Although race can help to target medical screenings for a disease-associated mutation that is present at a high frequency in one population and is relatively absent in another, it is impossible for race as we recognize it clinically to provide both perfect sensitivity and specificity for the presence of a DNA-sequence variant (Cooper, Kaufman, & Ward, 2003). In other words, individual genetic profiles are in many ways superior to racial/ethnic categories for the medical diagnosis and treatment of patients. In the future, we can expect that progress in the field of medical biotechnology will increasingly negate the old-fashioned concept that differences in genetic susceptibility to common diseases are racially or ethnically distributed (Cooper, Kaufman, & Ward, 2003). As scientific progress moves away from the notion that biological differences exist across racial groups and increasingly focuses on genetic differences at an individual-level, it is hoped that progress in the field of genetics will ultimately provide for greater social and racial equality in society.

Yet, given the challenges associated with the creation and maintenance of personal genetic profiles, for the time being scientific researchers and doctors are likely to continue relying on groupings that are more easily identifiable, such as race. Currently, a substantial amount of pharmacological research continues to focus on differences across racial and ethnic groups. Accordingly, scholars and medical

practitioners must continue to grapple with questions regarding the best methods for communicating new scientific developments related to genetics, race, and medicine. As recent scholarship highlights, communicative appeals to the biological sameness of humanity may be used to combat an emphasis on differences across racial groups and reduce discrimination toward minority racial and ethnic groups (Chow-White, 2009).

This dissertation also demonstrates that the media are an important locus of research for empirical studies on the implications of advances in genetics and medicine. Media play an important role in science communication, both reflecting and shaping public attitudes about particular issues and new technologies (Caulfield & Harry, 2008). Mass media also represent a primary source of health and science information for many Americans, including scientists and physicians, and discoveries of new disease-related genes have appeared regularly in the print and media broadcast (Geller, Bernhardt, & Holtzman, 2002). In addition, this research suggests that people's news media habits influence their perceptions about genetics and personalized medicine. Attention to news about science and health was shown to moderate the effects of the stimulus messages on people's attitudes toward personalized medicine in Study 2. More specifically, respondents' attention to science news interacted with the stimulus messages to influence the perceived benefits and concerns that participants associated with personalized medicine.

More research is still needed to address the impact of news coverage, journalistic norms and news media exposure on public attitudes about developments in the fields of genetics and personalized medicine. Whereas recent studies have begun to examine the

process of transmitting scientific research findings from the laboratory to medical press releases and news media reports (Brechman, Lee, & Cappella, 2009; Condit, 2004), research has yet to examine the role of journalistic norms and news production routines in shaping the content of news media coverage about genetics and medicine. Future research may also study the media selection patterns and demographics of audiences for news about science and health, including messages about genetics and race. With regard to racial cues in the news media environment, recent studies have provided evidence of differences in news selection patterns as a function of race (Knowbloch-Westerwick, Appiah, & Alter, 2008). Knowbloch-Westerwick and her colleagues found that African Americans preferred news stories featuring African Americans, and spent more than twice the reading time on them compared to news stories featuring Whites; in contrast, Whites showed no preference based on the race of the character featured in the news story. It would be interesting to consider whether this pattern of news selection and African Americans' preference for news reports about in-group racial targets would be replicated in the context of news specifically focused on science, health, or genetics.

In sum, this research contributes to a burgeoning body of literature on public opinion about genetics, race, and health. The dissertation builds on the literature by examining the effects of health messages linking genetics and race on public attitudes and policy preferences. The findings support the idea that messages about genetics, race, and health function within an intricate structure of attitudes and beliefs (Condit & Bates, 2005). Overall, this research adds to a growing body of empirical work evidencing that public attitudes about genetics and race are complex. The dissertation provides evidence



to suggest that racial cues and controllability attributions in messages about genetics and health influence public opinion about personalized medicine and related health policies. Although the literature generally offers support for the idea that media framing impacts people's policy opinions as a consequence of attributional processes and judgments of responsibility, very few studies to date have examined these issues in the context of genetics and personalized medicine.

This research reveals that attributions and intergroup racial cues in media messages are important ingredients in shaping public opinion and policy preferences regarding genetics and personalized medicine. The results illustrate the multifaceted and sometimes limited ways that message framing can impact public opinion on issues related to genetics, personalized medicine and health. As Jacoby (2000) notes, framing can have powerful effects on the determinants of attitudes toward current issues and policies, as well as perceptions about the relative benefits and disadvantages of public policy initiatives. Moreover, perceptions about the reasons for illness and health disparities, and by extension, who or what is responsible to ameliorate them, are important factors for public acceptance of policy strategies to mitigate health disparities (Gollust, 2008).

This dissertation addresses a socially consequential area of research because recent studies have shown that casting race as a genetic or biological marker can provide justification for a racially inequitable status quo and for the continued social marginalization of historically disadvantaged groups (Williams & Eberhardt, 2008). Dramatic developments in genetics research have begun to transform not only the practice of medicine but also public perceptions about the social world (Brueckner,

Morning, & Nelson, 2005). Scholarship in this area is timely because most of the U.S. public is still at the early stages of forming beliefs and attitudes about genetics and race, and the media are largely influential in citizens' awareness and understanding of genomics (Smith, 2007).

It is also important to consider the ways that the media influence public perceptions about scientific developments because the lay public in a democratic society can exert substantial influence on the progress of science, medicine, and the use of science-based technologies (Condit, 2001). As evidenced by the current healthcare debate in America, public health initiatives and progress may be stymied by a lack of public support for and understanding about reform efforts. To date, studies have only begun to examine the complexities of public opinion about genetics and race, and much more remains to be done as the target is by nature, a moving one (Condit, 2001). As genomics enters the realm of public health, not only are changes required in research and the inferences that follow, but the nature of the discourse surrounding those inferences must also change (Cooper, 2003). Certainly, greater consideration should be afforded to the ways that new scientific discoveries regarding genetics, race and health are communicated in the public sphere. It remains to be seen whether modern advances in the fields of genetics and personalized medicine will remedy or exacerbate existing health disparities.

## REFERENCES

- Abramsky, L., and Fletcher, O. (2002). Interpreting information: What is said, what is heard—a questionnaire study of health professionals and members of the public. *Prenatal Diagnosis*, 22: 1188-1194.
- Adelman, R. C., and Verbrugge, L. M. (2000). Death makes news: The social impact of disease on newspaper coverage. *Journal of Health and Social Behavior*, 41(3): 347-367.
- Affleck, G., Tennen, H., and Croog, S. (1987). Causal attribution, perceived control, and recovery from a heart attack. *Journal of Social and Clinical Psychology*, 5(3): 339-355.
- Allison, S. T., and Messick, D. M. (1985). The group attribution error. *Journal of Experimental Social Psychology*, 21: 563-579.
- Allport, G. W. (1954). *The nature of prejudice*. Reading, MA: Addison-Wesley.
- Amodio, D. M., Devine, P. G., and Harmon-Jones, E. (2008). Individual differences in the regulation of intergroup bias: The role of conflict monitoring and neural signals for control. *Journal of Personality and Social Psychology*, 94(1): 60-74.
- Armstrong, K., Hughes-Halbert, C., and Asch, D. A. (2006). Patient preferences can be misleading as explanations for racial disparities in health care. *Archives of Internal Medicine*, 166(9): 950-954.

- Baty, B.J., Kinney, A.Y., and Ellis, S.M. (2003). Developing culturally sensitive cancer genetics communication aids for American Americans. *American Journal of Medical Genetics*, 118A: 146-155.
- Beauchamp, D. E. (1976). Public health as social justice. *Inquiry*, 13: 3-14.
- Beauchamp, D. E. (1980). Public health and individual liberty. *Ann. Rev. Public Health*, 1: 121-136.
- Benamins, M. R. and Brown, C. (2004). Religion and preventative health care utilization among the elderly. *Social Science & Medicine*, 58: 109-118.
- Berinsky, A. J. (2002). Silent voices: Social welfare policy opinions and political equality in America. *American Journal of Political Science*, 46(2): 276-287.
- Bevan, J. L., Lynch, J. A., Dubriwny, T. N., Harris, T. M., Achter, P. J., Reeder, A. L., and Condit, C. M. (2003). Informed lay preferences for delivery of racially varied pharmacogenomics. *Genetics in Medicine*, 5(5): 393-399.
- Billings, P. R. (1989). Debunking the genetic myth. *Technology Review*, 92(6): 75-76.
- Billings, P. R., Kohn, M. A., de Cuevas, M., Beckwith, J., Alper, J. S., and Natowicz, M. R. (1992). Discrimination as a consequence of genetic testing. *American Journal of Human Genetics*, 50: 476-482.
- Bobo, L. (1988). Attitudes toward the Black political movement: Trends, meaning, and effects on racial policy preferences. *Social Psychology Quarterly*, 51(4): 287-302.
- Brechman, J., Lee, C-J., Cappella, J. N. (2009). Lost in translation? A comparison of cancer-genetics reporting in the press release and its subsequent coverage in the press. *Science Communication*, 30(4): 453-474.

- Brewer, M. B., and Kramer, R. M. (1985). The psychology of intergroup attitudes and behavior. *Ann. Rev. Psychology*, 36: 219-243.
- Brodie, M., Hamel, E. C., and Altman, D. E. (2003). Health news and the American public, 1996-2002. *Journal of Health Politics, Policy, and Law*, 28(5): 927-950.
- Brodish, A. B., Brazy, P. C., and Devine, P. G. (2008). More eyes on the prize: Variability in White Americans' perceptions of progress toward racial equality. *Personality and Social Psychology Bulletin*, 34(4): 513-527.
- Brueckner, H., Morning, A., and Nelson, A. (2005). The expression of biological concepts of race. Paper presented at the Annual Meeting of the American Sociological Association, Philadelphia, PA.
- Bubela, T. M., and Caulfield, T. A. (2004). Do the print media "hype" genetic research? A comparison of newspaper stories and peer-reviewed research papers. *Canadian Medical Association Journal*, 170(9): 1399-1407.
- Burchard, E. G., Ziv, E., Coyle, N., et al. (2003). The importance of race and ethnic background in biomedical research and clinical practice. *New England Journal of Medicine*, 348(12): 1170 - 1175.
- Cappella, J. N., Fishbein, R., Hornik, R., Ahern, R. K., and Sayeed, S. (2001). Using theory to select messages in anti-drug media campaigns: reasoned action and media priming. In R. Rice & C. Atkin, C. (Eds.), *Public communication campaigns*, (3rd ed., pp. 214-230), Thousand Oaks, CA: Sage.
- Cappella, J. N., and Jamieson, K. H. (1997). *Spirals of cynicism: The press and the public good*. New York, NY: Oxford.

- Cappella, J. N., Lerman, C., Romantan, A., and Baruh, L. (2005). News about genetics and smoking: Priming, family smoking history, and news story believability, inferring genetic susceptibility to tobacco addiction. *Communication Research*, 32(4): 478-502.
- Caulfield, T., and Harry, S. (2008). Popular representations of race: The news coverage of BiDil. *The Journal of Law, Medicine & Ethics*, 36(3): 485-490.
- Chatman, C. M., and von Hippel, W. (2001). Attributional mediation of in-group bias. *Journal of Experimental Social Psychology*, 37: 267-272.
- Chow-White, P. A. (2009). Data, code, and discourses of difference. *Communication Theory*, 19: 219-247.
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2<sup>nd</sup> Edition). Hillsdale: NJ: Lawrence Erlbaum Associates.
- Condit, C. (1999). How the public understands genetics: Non-deterministic and non-discriminatory interpretations of the 'blueprint' metaphor. *Public Understanding of Science*, 8: 169-180.
- Condit, C. (2004). Science reporting to the public: Does the message get twisted? *Canadian Medical Association Journal*, 170(9): 1415-1416.
- Condit, C., and Bates, B. (2005). How lay people respond to messages about genetics, health and race. *Clinical Genetics*, 68: 97-105.
- Condit, C., Ferguson, A., Kassel, R., Thadhani, C., Gooding, H.C., Parrott, P., et al. (2001). An exploratory study of the impact of news headlines on genetic determinism. *Science Communication*, 22: 379-395.

- Condit, C., Ofulue, N. and Sheedy, K. M. (1998). Determinism and mass-media portrayals of genetics. *American Journal of Human Genetics*, 62(4): 979-984.
- Condit, C., Parrott, R., Bates, B., Bevan, J., and Achter, P. (2004a). Exploration of the impact of messages about genes and race on lay attitudes. *Clinical Genetics*, 66: 402-408.
- Condit, C., Parrot, R., Harris, T.M., Lynch, J.A., and Dubriwny, T. (2004b). The role of 'genetics' in popular understanding of race in the United States. *Public Understanding of Science*, 13: 249-272.
- Condit, C., and Parrott, R. (2004). Perceived levels of health risk associated with linguistic descriptors and type of disease. *Science Communication*, 26(2): 152-161.
- Conrad, P., and Weinberg, D. (1996). Has the gene for alcoholism been discovered three times since 1980? A news media analysis. *Perspectives on Social Problems*, 8: 3-25.
- Condit, C., and Williams, M. (1997). Audience responses to discourse of medical genetics. *Health Communication*, 9: 219-235.
- Cooper, R. (2003). Race, genes, and health – new wine in old bottles? *International Journal of Epidemiology*, 32: 23-25.
- Cooper, R., Cutler, J., Desvigne-Nickens, P., Fortmann, S., Friedman, L., et al. (2000). Trends and disparities in coronary heart disease, stroke, and other cardiovascular diseases in the United States: Findings of the national conference on cardiovascular disease prevention. *Circulation*, 102: 3137-3147.

- Cooper, R., Kaufman, J. S., and Ward, R. (2003). Race and genomics. *New England Journal of Medicine*, 348(12): 1166-1170.
- Devine, P. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, 56, 5-18.
- Dovidio, J. F., and Gaertner, S. L. (1981). The effects of race, status, and ability on helping behavior. *Social Psychology Quarterly*, 44(3): 192-203.
- Dovidio, J. F., and Gaertner, S. L. (1998). On the nature of contemporary prejudice: The causes, consequences, and challenges of aversive racism. In J. L. Eberhardt & S. T. Fiske (Eds.), *Confronting racism: The problem and the response* (pp. 3-32). Thousand Oaks, CA: Sage.
- Dovidio, J. F., and Gaertner, S. L. (2000). Aversive racism and selection decisions: 1989 and 1999. *Psychological Science*, 11(4): 315-319.
- Druckman, J. N. (2001). The implication of framing effects for citizen competence. *Political Behavior*, 23(3): 226-256.
- Druckman, J. N., and Nelson, K. R. (2003). Framing and deliberation: How citizens' conversations limit elite influence. *American Journal of Political Science*, 47(4): 729-745.
- Duncan, B. L. (1976). Differential social perception and attribution of intergroup violence: Testing the lower limits of stereotyping of Blacks. *Journal of Personality and Social Psychology*, 34(4): 590-598.



- Eltis, K. (2007). Genetic determinism and discrimination: A call to re-orient prevailing human rights discourse to better comport with the public implications of individual genetic testing. *Journal of Law, Medicine & Ethics*, 35(2): 282-294.
- Entman, R. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication*, 43, 51-58.
- Feather, N. T. (1998). Reactions to penalties for offenses committed by the police and public citizens: Testing a social-cognitive process model of retributive justice. *Journal of Personality and Social Psychology*, 75(2): 528-544.
- Federico, C. M. (2004). When do welfare attitudes become racialized? The paradoxical effects of education. *American Journal of Political Science*, 48(2): 374-391.
- Federico, C. M., and Sidanius, J. (2002). Sophistication and the antecedents of Whites' racial policy attitudes: Racism, ideology, and affirmative action in America. *Public Opinion Quarterly*, 66(2): 145-176.
- Feldman, S., and Huddy, L. (2005). Racial resentment and White opposition to race-conscious programs: Principles or prejudice? *American Journal of Political Science*, 49(1): 168-183.
- Field, A. (2005). *Discovering Statistics Using SPSS*. London, UK: Sage Publications.
- Finnegan, J., Viswanath, K., and Hertog, J. (1999). Mass media, secular trends, and the future of cardiovascular disease prevention: An interpretive analysis. *Preventive Medicine*, 29: 50-58.
- Fiske, S. T., and Taylor, S. E. (1991). *Social cognition* (2nd Ed.). New York, NY: McGraw Hill.

- French, D. P., Marteau, T. M., Senior, V., and Weinman, J. (2000). Perceptions of multiple risk factors for heart attacks. *Psychological Reports*, 87(2): 681-687.
- French, D. P., Senior, V., Weinman, J., and Marteau, T. M. (2001). Causal attributions for heart disease: A systematic review. *Psychology and Health*, 16: 77-98.
- Gaertner, S. L., and Dovidio, J. F. (1986). The aversive form of racism. In: J.F. Dovidio and S.L. Gaertner (Eds.), *Prejudice, discrimination and racism: Theory and research* (pp. 61-89). Orlando, FL: Academic Press.
- Gaertner, S. L., and Dovidio, J. F. (2005). Understanding and addressing contemporary racism: From aversive racism to the common in-group identity model. *Journal of Social Issues*, 61(3): 615-639.
- Geller, G., Bernhardt, B. A., and Holtzman, N. A. (2002). The media and public reactions to genetic research. *JAMA*, 287(6): 773.
- Gerbner, G., and Gross, L. (1976). Living with television: The violence profile. *Journal of Communication*, 26, 172-199.
- Gerbner, G., Gross, L., Morgan, M., and Signorielli, N. (1986). Living with television: The dynamics of the cultivation process. In J. Bryant & D. Zillman (Eds.), *Perspectives on media effects* (pp. 17-40). Hilldale, NJ: Lawrence Erlbaum Associates.
- Gilens, M. (1999). *Why Americans hate welfare: Race, media, and the politics of antipoverty policy*. Chicago, IL: University of Chicago Press.
- Gilliam, F., and Iyengar, S. (2005). Prime suspects: The influence of local television news on the viewing public. *American Journal of Political Science*, 44: 560-573.

- Gollust, S. E. (2008). *The impact of news media frames of type 2 diabetes on the public's health policy opinions*. University of Michigan: Unpublished Dissertation.
- Graber, D. (2005). Political communication faces the 21<sup>st</sup> century. *Journal of Communication*, 55(3): 479-507.
- Green, R.M., and Thomas, A.M. (1998). DNA: Five distinguishing features for policy analysis. *Harvard Journal of Law & Technology*, 11(3): 571-591.
- Griffin, R. J., and Sen, S. (1995). Causal communication: Movie portrayals and audience attributions for Vietnam veterans' problems. *Journalism and Mass Communication Quarterly*, 72(3): 511-524.
- Heckathorn, D. D., and Maser, S. M. (1990). The contractual architecture of public policy: A critical reconstruction of Lowi's typology. *The Journal of Politics*, 52(4): 1101-1123.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York, NY: John Wiley.
- Henry, P. J., and Sears, D. O. (2002). The symbolic racism 2000 scale. *Political Psychology*, 23(2): 253-283.
- Hewstone, M. (1990). The 'ultimate attribution error'? A review of the literature on intergroup causal attribution. *European Journal of Social Psychology*, 20: 311-335.
- Hilton, J. L., and von Hippel, W. (1996). Stereotypes. In J. T. Spence, J. M. Darley, & D. J. Foss (Eds.), *Annual Review of Psychology*, (Vol. 47, pp. 237-271). Palo Alto, CA: Annual Reviews.

- Ho, S. S., Brossard, D., and Scheufele, D. A. (2008). Effects of value predispositions, mass media use, and knowledge on public attitudes toward embryonic stem cell research. *International Journal of Public Opinion Research*, 20: 171-192.
- Huber, G. A., and Lapinski, J. S. (2006). The 'race card' revisited: Assessing racial priming in policy contests. *American Journal of Political Science*, 50(2): 421-440.
- Hurwitz, J., and Peffley, M. (2005). Playing the race card in the post-Willie Horton era: The impact of racialized code words on support for punitive crime policy. *Public Opinion Quarterly*, 69(1): 99-112.
- Islam, M. R., and Hewstone, M. (1993). Intergroup attributions and affective consequences in majority and minority groups. *Journal of Personality and Social Psychology*, 64(6): 936-950.
- Iyengar, S. (1987). Television news and citizens' explanations of national affairs. *American Political Science Review*, 81: 815-831.
- Iyengar, S. (1991). *Is anyone responsible? How television frames political issues*. Chicago, IL: University of Chicago Press.
- Iyengar, S., and Kinder, D. R. (1987). *News that matters: Television and American opinion*. Chicago, IL: University of Chicago Press.
- Iyengar, S., and Simon, A. (1994). News coverage of the gulf crisis and public opinion. In W. L. Bennett & D. I. Paletz (Eds.). *Taken by storm – The media, public opinion, and U.S. foreign policy in the Gulf War* (Ch. 8, pp.167 - 185). Chicago, IL: University of Chicago Press.

- Jaccard, J. (1998). *Interaction effects in factorial analysis of variance*. Newbury Park, CA: Sage Publications.
- Jackson, L. A., Sullivan, L. A., and Hodge, C. N. (1993). Stereotype effects on attributions, predictions, and evaluations: No two social judgments are quite alike. *Journal of Personality and Social Psychology*, 65(1): 69-84.
- Jacoby, W. G. (2000). Issue framing and public opinion on government spending. *American Journal of Political Science*, 44(4): 750-767.
- Jeong, S.-H. (2007). Effects of news about genetics and obesity on perceived controllability and helping behavior. *Health Communication*, 22(3): 221-228.
- Jeong, S.-H. (2008). *Effects of media attributions and racial cues in news about obesity on the public's attributions about weight and opinions about health policies*. University of Pennsylvania: Unpublished Dissertation.
- Jorde, L.B., and Wooding, S.P. (2004). Genetic variation, classification and 'race.' *Nature Genetics*, 36(11): 28-33.
- Kam, C. D., and Kinder, D. R. (2007). Terror and ethnocentrism: Foundations of American support for the war on terrorism. *The Journal of Politics*, 69(2): 320-338.
- Kawakami, K., Dion, K. L., and Dovidio, J. F. (1998). Racial prejudice and racial stereotype activation. *Personality and Social Psychology Bulletin*, 24(4): 407-416.
- Kelley, H. H. (1967). Attribution theory in social psychology. In D. Levine (Ed.), *Nebraska symposium on motivation* (vol. 15). Lincoln, NE: University of Nebraska Press.

- Kelley, H. H. (1973). The process of causal attribution. *Amer. Psychologist*, 28: 107-128.
- Kellstedt, P. M. (2000). Media framing and the dynamics of racial policy preferences. *American Journal of Political Science*, 44(2): 239-255.
- Kenen, R.H., and Schmidt, R.M. (1978). Stigmatization of carrier status: Social implications of heterozygote genetic screening programs. *American Journal of Public Health*, 68(11): 1116-1120.
- Kenworthy, J. B., and Miller, N. (2002). Attributional biases about the origins of attitudes: Externality, emotionality, and rationality. *Journal of Personality and Social Psychology*, 82(5): 693-707.
- Keppel, G., and Wickens, T. D. (2004). *Design and Analysis: A researcher's handbook* (4<sup>th</sup> Ed.). Upper Saddle River, NJ: Prentice Hall.
- Kerr, A., Cunningham-Burley, S., and Amos, A. (1998). Drawing the line: An analysis of lay people's discussions about the new genetics. *Public Understanding of Science*, 7: 113-133.
- Kessler, L., Collier, A., and Hughes-Halbert, C. (2007). Knowledge about genetics among African Americans. *Journal of Genetic Counseling*, 16(2): 191-200.
- Kinder, D. R., and Sanders, L. M. (1990). Mimicking political debate with survey questions: The case of White opinion on affirmative action. *Social Cognition*, 8(1): 73-103.
- Kinder, D. R., and Sanders, L. M. (1996). *Divided by color: Racial politics and democratic ideals*. Chicago, IL: Chicago University Press.

- Kinder, D. R., and Winter, N. (2001). Exploring the racial divide: Blacks, Whites, and opinion on national policy. *American Journal of Political Science*, 45(2): 439-456.
- Knobloch-Westerwick, S., Appiah, O., and Alter, S. (2008). News selection patterns as a function of race: The discerning minority and indiscriminating majority. *Media Psychology*, 11(3): 400-417.
- Koenig, H. G., and Larson, D. B. (1998). Use of hospital services, religious attendance, and religious affiliation. *Southern Medical Journal*, 91(10): 925-932.
- Kovel, J. (1970). *White racism: A psychohistory*. New York, NY: Pantheon.
- Lawrence, R. G. (2000). Game-framing the issues: Tracking the strategy frame in public policy news. *Political Communication*, 17(2): 93-114.
- Lee, N-J., McLeod, D. M., and Shah, D. V. (2008). Framing policy debates: Issue dualism, journalistic frames, and opinions on controversial policy issues. *Communication Research*, 35(5): 695-718.
- Lee, S. (2003). Race, distributive justice, and the promise of pharmacogenomics. *American Journal of Pharmacogenomics*, 3(6): 385-392.
- Lee, S. (2005). Racializing drug design: Implications for pharmacogenomics for health disparities. *American Journal of Public Health*, 95(12): 2133-2138.
- Lemish, D. (1985). Soap opera viewing in college: A naturalistic inquiry. *Journal of Broadcasting & Electronic Media*, 29 (summer): 275-293.
- Levin, J. S., and Schiller, P. L. (1987). Is there a religious factor in health? *Journal of Religion and Health*, 26(1): 9 – 36.

- Link, B. G., and Phelan, J. C. (2006). Stigma and its public health implications. *Lancet*, 367: 528-529.
- Lowi, T. J. (1964). American business, public policy, case-studies, and political theory. *World Politics*, 16(4): 677-715.
- Lowi, T. J. (1972). Four systems of policy, politics, and choice. *Public Administration Review*, 32(4): 298-310.
- Lupton, D., and Chapman, S. (1995). 'A healthy lifestyle may be the death of you': Discourses on diet, cholesterol control and heart disease in the press and among the lay public. *Sociology of Health & Illness*, 17(4): 477-494.
- Lynch, J., Bevan, J., Achter, P., Harris, T., and Condit, C. (2008). A preliminary study of how multiple exposures to messages about genetics impact on lay attitudes towards racial and genetic discrimination. *New Genetics and Society*, 27(1): 43-56.
- Mass, A., Milesi, A., Zabbini, S., and Stahlberg, D. (1995). Linguistic intergroup bias: Differential expectancies or in-group protection. *Journal of Personality and Social Psychology*, 68: 116-126.
- McConahay, J. B. (1986). Modern racism, ambivalence, and the modern racism scale. In J. F. Dovidio & S. L. Gaertner (Eds.), *Prejudice, discrimination, and racism*, (pp. 91-126). New York, NY: Academic Press.
- McDonald, S. J. (2001). How Whites explain Black and Hispanic inequality. *Public Opinion Quarterly*, 65(4): 562-573.



- Mendelberg, T. (2001). *The race card: Campaign strategy, implicit messages, and the norm of equality*. Princeton, NJ: Princeton University Press.
- Mendelberg, T. (2008). Racial priming revived. *Perspectives on Politics* 6(1): 109-123 (March, 2008).
- Mendelberg, T., and Oleske, J. (2000). Race and public deliberation. *Political Communication*, 17: 169-191.
- Mensah, G.A. (2005). Eliminating disparities in cardiovascular health: Six strategic imperatives and a framework for action. *Circulation*, 111: 1332-1336.
- Miller, J. D. (1983). Scientific literacy: A conceptual and empirical review. *Daedalus*, 112(2), 29-48.
- Miller, J. M. and Krosnic, J. A. (1996). News media impact on the ingredients of presidential evaluations: A program of research on the priming hypothesis. In D.C. Mutz, P.M. Sniderman, and R.A. Brody (Eds.) *Political persuasion and attitude change* (pp. 79-100). Ann Arbor, MI: University of Michigan Press.
- Murphy-Berman, V. A., Berman, J. J., and Campbell, E. (1998). Factors affecting health-care allocation decisions: A case of aversive racism? *Journal of Applied Social Psychology*, 28: 2239-2253.
- Nelson, T. E., and Kinder, D. R. (1996). Issue frames and group-centrism in American public opinion. *The Journal of Politics*, 58(4): 1055-1078.
- Nisbet, M. (2005). The competition for worldviews: Values, information, and public support for stem cell research. *International Journal of Public Opinion Research*, 17(1): 90-112.

- Nisbet, M., and Huge, M. (2006). Attention cycles and frames in the plant biotechnology debate. *Press/Politics* 11(2): 3-40.
- Nisbet, M., Scheufele, D., Shanahan, J., Moy, P., Brossard, D., and Lewenstein, B. (2002). Knowledge, reservations or promise? A media effects model for public perceptions of science and technology. *Communication Research*, 29(5): 584-608.
- Oliver, J. E., and Mendelberg, T. (2000). Reconsidering the environmental determinants of White racial attitudes. *American Journal of Political Science*, 44(3): 574-589.
- Otlowski, M.F., Taylor, S.D., and Barlow-Stewart, K.K. (2003). Genetic discrimination: Too few data. *European Journal of Human Genetics*, 11: 1-2.
- Page, B.I. and Shapiro, R.Y. (1992). *The Rational Public: Fifty years of trends in Americans' policy preferences*. Chicago, IL: The University of Chicago Press.
- Pan, Z., and Kosicki, G. M. (1996). Assessing news media influences on the formation of whites' racial policy preferences. *Communication Research*, 23(2): 147-178.
- Parrott, R., Silk, K., Krieger, J.R., and Condit, C. (2003). Diversity in lay perceptions of the sources of human traits: Genes, environments and personal behaviors. *Social Science & Medicine*, 56: 1099-1109.
- Parrott, R., Silk, K., Krieger, J.R., Harris, T., and Condit, C. (2004). Behavioral health outcomes associated with religious faith and media exposure about human genetics. *Health Communication*, 16(1): 29-45.
- Pechmann, C. (2001). A Comparison of Health Communication Models: Risk Learning Versus Stereotype Priming. *Media Psychology*, 3, 189-210.

- Pechmann, C., and Knight, S. J. (2002). An experimental investigation of the joint effects of advertising and peers on adolescents' beliefs and intentions about cigarette consumption. *Journal of Consumer Research*, 29 (June): 5-19.
- Pechmann, C., and Ratneshwar, S. (1994). The effects of anti-smoking and cigarette advertising on young adolescents' perceptions of peers who smoke. *Journal of Consumer Research*, 21: 236-251.
- Peffley, M., and Hurwitz, J. (2002). The racial components of 'race-neutral' crime policy attitudes. *Political Psychology*, 23(1): 59-75.
- Penziner, E., Williams, J.K., Erwin, C., Bombard, Y., Wallis, A., Beglinger, L.J., Hayden, M.R., and Paulsen, J.S. (2007). Perceptions of discrimination among persons who have undergone predictive testing for Huntington's disease. *American Journal of Medical Genetics (Part B)*: 1-8.
- Perdue, C. W., Dovidio, J. F., Gurtman, M. B., and Tyler, R. B. (1990). Us and them: Social categorization and the process of intergroup bias. *Journal of Personality and Social Psychology*, 59(3): 475-486.
- Perse, E. M., and Rubin, R. B. (1989). Attribution in social and parasocial relationships. *Communication Research*, 16 (February): 59-77.
- Pettigrew, T. F. (1979). The ultimate attribution error: Extending Allport's cognitive analysis of prejudice. *Personality and Social Psychology Bulletin*, 5: 461-477.
- Pettigrew, T. F., and Meertens, R. W. (1995). Subtle and blatant prejudice in Western Europe. *European Journal of Social Psychology*, 25: 57-75.

- Power, J. G., Murphy, S. T., and Coover, G. (1996). Priming prejudice: How stereotypes and counter-stereotypes influence attribution of responsibility and credibility among in-groups and out-groups. *Human Communication Research*, 23(1): 36-58.
- Price, V., Nir, L., and Cappella, J.N. (2005). Framing Public Discussion of Gay Civil Unions. *Public Opinion Quarterly*, 69: 179-212.
- Price, V., and Tewksbury, D. (1997). News values and public opinion: A theoretical account of media priming and framing. In G. Barnett & F. J. Boster (Eds.), *Progress in the communication sciences* (Vol. 13, pp.193-212). Greenwich, CT: Ablex.
- Reutter, L. J., Veenstra, G., Stewart, M. J., Raphael, D., Love, R., Makwarimba, E., et al. (2006). Public attributions for poverty in Canada. *The Canadian Review of Sociology and Anthropology*, 43(1): 1-22.
- Richardson, J. D. (2005). Switching social identities: The influence of editorial framing on reader attitudes toward affirmative action and African Americans. *Communication Research*, 32: 503-528.
- Roskos-Ewoldsen, D. R., Roskos-Ewoldsen, B., and Carpentier, F. R. D. (2002). Media priming: A synthesis. In J. B. Bryant & D. Zillman (Eds.), *Media effects: Advances in theory and research* (2<sup>nd</sup> Edition, pp. 97-120). Mahwah, NJ: Lawrence Erlbaum.
- Roskos-Ewoldsen, D. R., Klinger, M. R., and Roskos-Ewoldsen, B. (2007). Media priming: A meta-analysis. In R.W. Preiss, B.M. Gayle, N. Burrell, M. Allen, and

- J. Bryant (Eds.) *Mass media effects research: Advances through meta-analysis* (pp. 53-80) Mahwah, NJ: Lawrence Erlbaum.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80: 1-26.
- Sankar, P., and Kahn, J. (2005). BiDil: Race medicine or race marketing? *Health Affairs*, W5: 455-463.
- Sankofa, J., and Johnson-Taylor, W. (2007). News coverage of diet-related health disparities experienced by Black Americans: A steady diet of misinformation. *Journal of Nutrition Education and Behavior*, 39(2S): 41-44.
- Saucier, D. A., Miller, C. T., and Doucet, N. (2005). Differences in helping Whites and Blacks: A meta-analysis. *Personality and Social Psychology Review*, 9(1): 2-16.
- Schulz, A., Caldwell, C., and Foster, S. (2003). 'What are they going to do with the information?' Latino/Latina and African American perspectives on the Human Genome Project. *Health Education & Behavior*, 30(2): 151-169.
- Sears, D. O. (1988). In P. A. Katz & D. A. Taylor (Eds.), *Eliminating racism: Profiles in controversy* (p. 53-84). New York, NY: Plenum.
- Serretti, A., and Artioli, P. (2006). Ethical problems in pharmacogenetic studies of psychiatric disorders. *The Pharmacogenomics Journal*, 6: 289-295.
- Shelton, J. E. (2005). *The independent and joint effects of race and social class: An analysis of racially-specific and racially-neutral causal attributions and support for redistributive policy*. University of Michigan: Unpublished Dissertation.

- Silva, V. T. (2005). In the beginning was the gene: The hegemony of genetic thinking in contemporary culture. *Communication Theory*, 15(1): 100-123.
- Slack, J. (2005). Why the biotechnological body matters: Introduction to the special issue. *Communication Theory*, 15(1): 5-9.
- Smith, R. A. (2007). Picking a frame for communicating about genetics: Stigmas or challenges. *Journal of Genetic Counseling*, 16(3): 289-298.
- Sotirovic, M. (2003). How individuals explain social problems: The influences of media use. *Journal of Communication*, 53(1): 122-137.
- Staub, E. (1990). Moral exclusion: Personal goal theory and extreme destructiveness. *Journal of Social Issues*, 46: 47-64.
- Stephan, W. G. (1977). Stereotyping: The role of in-group-out-group differences in causal attribution. *Journal of Social Psychology*, 101, 255-266.
- Sullivan, R. (2005). An embryonic nation: Life against health in Canadian biotechnological discourse. *Communication Theory*, 15(1): 39-58.
- Suzuki, D.T., and Knudtson, P. (1989). *Genethics: The Clash between the New Genetics and Human Values*. Cambridge, MA: Harvard University Press.
- Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American*, 223 (May): 96-102.
- Tajfel, H. (1981). Social stereotypes and social groups. In Turner, J.C., Giles, H. (Eds.) *Intergroup Behavior*. Oxford: Blackwell Publishing.
- Tajfel, H. (1982). Social psychology of intergroup relations. *Ann. Rev. Psychol.* 33(1): 1-39.

- Tajfel, H., and Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The Social Psychology of Intergroup Relations*. Monterey, CA: Brooks-Cole.
- Tajfel, H., and Turner, J. C. (1986). The social identity theory of inter-group behavior. In S. Worchel & L. W. Austin (Eds.), *Psychology of intergroup relations* (pp. 2-24). Chicago, IL: Nelson-Hall.
- Tankard, J. W. Jr., Hendrickson, L., Silberman, J., Bliss, K., and Ghanem, S. (1991). Media frames: Approaches to conceptualization and measurement. Paper presented at the Convention of the Association for Education in Journalism and Mass Communication, Boston, MA.
- Taylor, D. M., and Jaggi, V. (1974). Ethnocentrism and causal attribution in a South Indian context. *Journal of Cross-Cultural Psychology*, 5: 162-171.
- Thompson, H.S., Valdimarsdottir, H.B., Jandorf, L., and Redd, W. (2003). Perceived disadvantages and concerns about abuses of genetic testing for cancer risk: differences across African American, Latina, and Caucasian Women. *Patient Education and Counseling*, 51(3): 217-227.
- Turner, J. C. (1982). Towards a cognitive redefinition of the social group. In H. Tajfel (Ed.), *Social identity and intergroup relations* (pp. 14-40). Cambridge, MA: Cambridge University Press.
- Turner, S. T., Schwartz, G. L., and Boerwinkle, E. (2007). Personalized medicine for high blood pressure. *Hypertension: Journal of the American Heart Association*, 50: 1-5.

- Tygart, C. E. (2000). Genetic causation attribution and public support for gay rights. *International Journal of Public Opinion Research*, 12(3): 259-275.
- Valentino, N. A. (1999). Crime news and the priming of racial attitudes during evaluations of the president. *Public Opinion Quarterly*, 63(3): 293-320.
- Valentino, N.A., Hutchings, V. L., and White, I. K. (2002). Cues that matter: How political ads prime racial attitudes during campaigns. *American Political Science Review*, 96(1): 75-90.
- Valentino, N. A., Traugott, M., and Hutchings, V. L. (2002). Group cues and ideological constraint: A replication of political advertising effects studies in the lab and in the field. *Political Communication*, 19(1): 29-48.
- Virtanen, S. V., and Huddy, L. (1998). Old fashioned racism and new forms of racial prejudice. *Journal of Politics*, 60(2): 311-332.
- Weber, J. G. (1994). The nature of ethnocentric attribution bias: In-group protection or enhancement? *Journal of Experimental Social Psychology*, 30: 482-504.
- Weiner, B. (1974). (Ed.). *Achievement motivation and attribution theory*. Morristown, NJ: General Learning Press.
- Weiner, B. (2006). *Social Motivation, justice, and the moral emotions: An attributional approach*. Los Angeles, CA: University of California Press.
- White, I. K. (2007). When race matters and when it doesn't: Racial group differences in response to racial cues. *American Political Science Review*, 101(2): 339-354.



- Williams, M.J., and Eberhardt, J.L. (2008). Biological conceptions of race and motivation to cross racial boundaries. *Journal of Personality and Social Psychology*, 94(6), 1033-1047.
- Winter, N. (2006). Beyond welfare: Framing and the racialization of White opinion on social security. *American Journal of Political Science*, 50(2): 400-420.
- Ybarra, O., and Trafimow, D. (1998). How priming the private self or collective self affects the relative weights of attitudes and subjective norms. *Personality and Social Psychology Bulletin*, 24(4): 362-370.
- Yzer, M. O., Cappella, J. N., Fishbein, M., Hornik, R., and Ahern, R. K. (2003). The effectiveness of gateway communications in anti-marijuana campaigns. *Journal of Health Communication*, 8(2): 129-143.
- Zimmerman, R.K., Tabbarah, M., Nowalk, M.P., Raymund, M., Jewell, I.K., Wilson, S.A., and Ricci, E.M. (2006). Racial differences in beliefs about genetic screening among patients at inner-city neighborhood health centers. *Journal of the National Medical Association*, 98(3): 370-377.

## APPENDIX A: STUDY 1 STIMULUS MESSAGES AND QUESTIONNAIRE

*Introduction to Personalized Medicine:* “Some doctors are using genetics as a basis for screening, diagnosing, and prescribing medication. This practice is called genetically targeted care. Because of their genetics, people respond better or worse than others to certain medications and medical treatments. Some say that using genetics to personalize medicine is a good way to tailor treatment to individuals and improve their overall medical care. Others say that genetically targeted care will discriminate against people that are less responsive to medication and limit their access to medical treatment.”

Questions for all participants:

1. Please select the ONE statement that comes closest to your view:

Note: Randomized order of responses

1a. Genetically targeted care will improve people’s overall medical care.	1
1b. Genetically targeted care will discriminate against people that are less responsive to medical treatment.	2

2. Now, please tell us how much you agree or disagree with each of those statements:

Note: Same random order as above

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
2a. Genetically targeted care will improve people’s overall medical care.	1	2	3	4	5
2b. Genetically targeted care will discriminate against people that are less responsive to medical treatment.	1	2	3	4	5

3. How much do you agree or disagree with the following statements:

Note: Randomized order of responses

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
3a. Genetically targeted care will make no difference in people's lives.	1	2	3	4	5
3b. People will <u>not</u> be willing to get a genetic test to find out how well they respond to medical treatment.	1	2	3	4	5
3c. Genetically targeted care will limit some people's access to medical treatment.	1	2	3	4	5
3d. People will <u>not</u> trust genetically targeted care.	1	2	3	4	5

“Currently, it is too costly and difficult for most doctors to obtain genetic profiles for each of their patients. In order to provide their patients with genetically targeted care, some doctors are using race as a substitute for individual genetic profiles because people of the same racial group tend to share many of the same genes.”

4. How much do you agree or disagree with the following statements:

Note: Randomized order of responses

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
4a. Using race to provide genetically targeted care is a good way to personalize medicine.	1	2	3	4	5

4b. Using race to provide genetically targeted care will limit some racial groups' access to medical treatment.	1	2	3	4	5
4c. People like me would trust medical care that is tailored for them based on their race.	1	2	3	4	5

Note: Participants randomly assigned to question '5a' or '5b'

5a.

	More harm than good	More good than harm	Both harm and good	Neither harm nor good
Do you think using race to provide genetically targeted care will do more harm than good, or more good than harm?	.	.	.	.

5b.

	More good than harm	More harm than good	Both harm and good	Neither harm nor good
Do you think using race to provide genetically targeted care will do more harm than good, or more good than harm?	.	.	.	.

6.

Note: Question for all participants - Fixed order of responses

	Not at all Interested	A little Interested	Somewhat Interested	Very Interested	Extremely Interested
6a. How interested would you be in getting more information about this topic?	1	2	3	4	5
6b. If the opportunity came up, how interested would you be in discussing this topic with others?	1	2	3	4	5

## APPENDIX B: STUDY 2 STIMULUS MESSAGES AND QUESTIONNAIRE

Note: All participants will first read the introduction statement and answer a set of survey questions. Next, a random half sample of participants will be assigned to the racial cue condition (Group A), and the other half of the split sample will be randomly assigned to the non-racial cue condition (Group B). After reading a brief statement (P1A or P1B), all participants (Groups A and B) will answer an identical set of questionnaire items.

ALL Participants Read Introduction:

*Introduction to Personalized Medicine:* “Doctors are using genetics as a basis for screening, diagnosing, and prescribing medication. This practice is called genetically targeted care. Because of their genetics, people respond better or worse than others to certain medications and medical treatments. Some say that genetically targeted care will discriminate against people that are less responsive to medications and limit their access to medical treatment. Others say that using genetics to personalize medicine is a good way to tailor treatment to individuals and improve their overall medical care.”

Note: Questions for ALL participants:

1. Please select the ONE statement that comes closest to your view:

Note: Randomized order of responses

1a. Genetically targeted care will improve people’s overall medical care.	1
1b. Genetically targeted care will discriminate against people that are less responsive to medical treatment.	2

2. Now, please tell us how much you agree or disagree with each of those statements:

Note: Same random order of responses as above

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
2a. Genetically targeted care will improve people’s overall medical care.	1	2	3	4	5

2b. Genetically targeted care will discriminate against people that are less responsive to medical treatment.	1	2	3	4	5
---	---	---	---	---	---

3. How much do you agree or disagree with the following statements:

Note: Randomized order of responses

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
3a. Genetically targeted care will make no difference in people's lives.	1	2	3	4	5
3b. Genetic testing should be used as a basis for medical treatment.	1	2	3	4	5
3c. Genetic testing will improve medical care.	1	2	3	4	5

Note: Randomly assign Rs to P1A or P1B.

Group A: Random Half Sample of Participants (racial cue group):

P1A. *Racial Cue*: "Some doctors are using race as a substitute for individual genetic profiles because it is too costly and difficult to obtain genetic profiles for each of their patients. In the absence of genetic testing, race is an alternate way to provide patients with genetically targeted care because people of the same racial group tend to share many of the same genes."

Group B: Random Half Sample of Participants (non-racial cue group):

P1B. *Non-Racial Cue*: "Some doctors are using individual genetic profiles to customize medical treatment to each of their patients. Although individual genetic profiles may be costly and difficult to obtain for each patient, it is a valuable way to provide patients with genetically targeted care because everyone has a unique genetic makeup."

Note: Questions for ALL participants:

4. Now, please tell us how much you agree or disagree with each of these statements:

Note: Randomized order of responses

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
4a. Genetically targeted care is a good way to personalize medicine.	1	2	3	4	5
4b. Genetically targeted care will limit some people's access to medical treatment.	1	2	3	4	5
4c. Genetically targeted care should <u>not</u> be used as a basis for medical treatment.	1	2	3	4	5
4d. People like me would benefit from genetically targeted care.	1	2	3	4	5
4e. People will <u>not</u> trust genetically targeted care.	1	2	3	4	5
4f. It is a good idea to get a genetic test to find out how well a person will respond to medical treatment.	1	2	3	4	5
4g. I would get a genetic test to find out which medications may work best for me.	1	2	3	4	5
4h. I would take a medication that was designed specifically for people like me.	1	2	3	4	5

## APPENDIX C: STUDY 3 STIMULUS MESSAGES

Design: 2 (controllability attribution: uncontrollable vs. controllable) x 2 (racial cue: African American vs. White) x 2 (race of respondent: African American vs. White)

	<p><i>Uncontrollable Message Attribution (genetics and heredity)</i></p> <p>“New Personalized Medicine Treatment Helps African Americans [Caucasians] with Genetic Risks for Heart Disease”</p>	<p><i>Controllable Message Attribution (diet and exercise)</i></p> <p>“New Personalized Medicine Treatment Helps Caucasians [African Americans] with Behavioral Risks for Heart Disease”</p>
Identical Introduction	<p>Researchers at the Delaware Medical Research Institute (DMRI) announced today the discovery of a new drug found to reduce the risk of heart disease in African Americans [Caucasians].</p>	
New Drug: Racial Cue and Controllability Attributions	<p>The drug, called Paxon, was shown in clinical trials to sharply lower the rates of heart disease among African Americans [Caucasians] — even those with a family history and genetic predisposition to the disease.</p> <p>As an anti-hypertensive agent, Paxon relaxes the arteries and decreases the work of the heart.</p>	<p>The drug, called Paxon, was shown in clinical trials to sharply lower the rates of heart disease among Caucasians [African Americans] — even those with high-fat diets and low physical fitness.</p> <p>As an anti-hypertensive agent, Paxon relaxes the arteries and decreases the work of the heart.</p>
Identical Information on Personalized Medicine, Genetics and Race	<p>The finding represents a major contribution to personalized medicine, which uses genetics to tailor medical treatments to individuals.</p> <p>“Paxon is a striking example of how we can apply genetics and race to explain variations in drug efficacy,” said Dr. Kenneth Samuels, Director of DMRI.</p> <p>In the absence of cost-effective and widespread genetic testing, many doctors and researchers are turning to race as a substitute for genetic similarity because people in the same racial group tend to share many similar forms of genes. These genetic patterns explain</p>	



	<p>why some drugs are more effective for people in the same racial group, and less effective for people in other racial groups.</p> <p>“Our long-term research goal,” Dr. Samuels added, “is to go beyond racial categories and determine the effectiveness of medical drugs for each individual’s genetic makeup.”</p> <p>Some in the medical community applaud the move toward tailoring heart disease treatment to specific racial groups. Others contend that race is a poor substitute for the person-specific genetic differences that influence responses to Paxon.</p>	
Heart Disease Information: Controllability Attributions	<p>Heart disease remains a leading cause of death and morbidity in the United States. The disease is caused by genetics and hereditary factors, as well as high-fat diets and physical inactivity.</p> <p>A large body of research shows that genetics and family history are highly significant risk factors for heart disease.</p> <p>“A person’s chances of getting heart disease are very much dominated by family genetics,” said Dr. Gail Jones, a professor of medicine at Northwestern University.</p> <p>“And people can’t control their family history,” added Dr. Jones.</p>	<p>Heart disease remains a leading cause of death and morbidity in the United States. The disease is caused by high-fat diets and physical inactivity, as well as genetics and hereditary factors.</p> <p>A large body of research shows that diets high in saturated fat and physical inactivity are highly significant risk factors for heart disease.</p> <p>“A person’s chances of getting heart disease are very much dominated by eating habits and fitness level,” said Dr. Gail Jones, a professor of medicine at Northwestern University.</p> <p>“And sometimes people make bad choices,” added Dr. Jones.</p>
Identical Ending	<p>Paxon offers new hope for reducing the incidence of heart disease, particularly among African Americans [Caucasians].</p>	

## APPENDIX D: STUDY 3 QUESTIONNAIRE

[Distributive Policy Items: #1 – 5]

1. How much would you support or oppose government funding to promote scientific research on personalized medicine (the development of medical drugs based on a person's genetics)?

Strongly  
Oppose

☐

Somewhat  
Oppose

☐

Neither Support  
nor Oppose

☐

Somewhat  
Support

☐

Strongly  
Support

☐

2. How much would you support or oppose government funding for the development of medical drugs for specific racial groups?

Strongly  
Oppose

☐

Somewhat  
Oppose

☐

Neither Support  
nor Oppose

☐

Somewhat  
Support

☐

Strongly  
Support

☐

3. How much would you support or oppose an increase in your taxes to provide government funding for public health campaigns to reduce heart disease among at-risk groups?

Strongly  
Oppose

☐

Somewhat  
Oppose

☐

Neither Support  
nor Oppose

☐

Somewhat  
Support

☐

Strongly  
Support

☐

4. How much would you support or oppose an increase in your taxes to provide funding for scientific research on personalized medicine (the development of medical drugs based on a person's genetics)?

Strongly  
Oppose

☐

Somewhat  
Oppose

☐

Neither Support  
nor Oppose

☐

Somewhat  
Support

☐

Strongly  
Support

☐

5. How much would you support or oppose an increase in your taxes to provide funding for the development of medical drugs for specific racial groups?

Strongly  
Oppose

☐

Somewhat  
Oppose

☐

Neither Support  
nor Oppose

☐

Somewhat  
Support

☐

Strongly  
Support

☐

[Regulatory Policy Items: #6 – 10]

6. How much would you support or oppose a policy requiring genetic testing of patients before they are prescribed Paxon so that doctors can determine if the drug is right for their genetic makeup?

Strongly Oppose	Somewhat Oppose	Neither Support nor Oppose	Somewhat Support	Strongly Support
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. How much would you support or oppose a policy requiring genetic testing for all patients to help doctors provide medical care that is tailored to each person's genetic makeup?

Strongly Oppose	Somewhat Oppose	Neither Support nor Oppose	Somewhat Support	Strongly Support
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. How much would you support or oppose a policy requiring that health insurance companies provide coverage for genetic testing to screen for common diseases like heart disease?

Strongly Oppose	Somewhat Oppose	Neither Support nor Oppose	Somewhat Support	Strongly Support
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. How much would you support or oppose more government oversight of pharmaceutical companies that develop medical drugs for specific racial groups?

Strongly Oppose	Somewhat Oppose	Neither Support nor Oppose	Somewhat Support	Strongly Support
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. How much would you support or oppose a policy allowing life insurance providers to adjust premiums based on whether or not people have risk factors for common diseases like heart disease?

Strongly Oppose	Somewhat Oppose	Neither Support nor Oppose	Somewhat Support	Strongly Support
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Do you think that the development of medical drugs based on a person's genetics (personalized medicine) will do more harm than good or more good than harm?

Much More Harm	Somewhat More Harm Than Good	Both Harm and Good Equally	Somewhat More Good Than Harm	Much More Good
•	•	•	•	•

12. Do you think that the development of medical drugs for specific racial groups will do more harm than good or more good than harm?

Much More Harm	Somewhat More Harm Than Good	Both Harm and Good Equally	Somewhat More Good Than Harm	Much More Good
•	•	•	•	•

13.

[Causal Attribution Items (Specific): #13.1 – 13.6]

Note: Randomized order of responses

The following are some commonly suggested causes of heart disease. For each item, please tell us if you think it's extremely important, very important, somewhat important, or not at all important.

	Not at all Important	Somewhat Important	Very Important	Extremely Important
Q13_1. Family History of Heart Disease				
Q13_2. Bad Luck or Fate				
Q13_3. Genetics				
Q13_4. Behavioral Choices				
Q13_5. Unhealthy Eating Habits				
Q13_6. Not Getting Enough Exercise				

14.

[Causal Attribution Items (General): #14.1 – 14.6]

Note: Randomized order of responses

How much do you agree or disagree with each of the following statements:

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
Q14_1. Heart disease is the result of choices people make in their lives.					
Q14_2. A person's chances of getting heart disease are beyond their control.					
Q14_3. People can avoid heart disease by maintaining a healthy lifestyle.					
Q14_4. Heart disease is outside a person's control.					
Q14_5. People who get heart disease are responsible for their condition.					
Q14_6. If people take the right actions, they can prevent heart disease.					

15.

[Opinions about Personalized Medicine: #15.1 – 15.6]

Note: Randomized order of responses

How much do you agree or disagree with each of the following statements:

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
Q15_1. Personalized medicine will improve people's overall medical care.					
Q15_2. Personalized medicine will discriminate against people that are less responsive to medical treatment.					
Q15_3. Personalized medicine will limit some people's access to medical treatment.					
Q15_4. Personalized medicine will make no difference in people's lives.					
Q15_5. People like me would benefit from personalized medicine.					
Q15_6. People will not trust personalized medicine.					

16.

[Opinions about Race-Based Medicine: #16.1 – 16.5]

Note: Randomized order of responses

How much do you agree or disagree with each of the following statements:

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
Q16_1. Developing medical drugs for specific racial groups is a good way to fight disease.					
Q16_2. Race is a good way to personalize medical treatment.					
Q16_3. Genetic testing should be used as a basis for medical treatment.					
Q16_4. Genetic testing will improve medical care.					
Q16_5. It is a good idea to get a genetic test to find out how well a person will respond to medical treatment.					

[Manipulation Check Items: #17 – 21]

17. How much do you agree or disagree with what the press release said about significant risk factors for heart disease in the United States?

Strongly  
Disagree

☐

Somewhat  
Disagree

☐

Neither Agree  
nor Disagree

☐

Somewhat  
Agree

☐

Strongly  
Agree

☐

18. How much do you agree or disagree with what the press release said about the use of race to develop medical treatments for heart disease?

Strongly  
Disagree

☐

Somewhat  
Disagree

☐

Neither Agree  
nor Disagree

☐

Somewhat  
Agree

☐

Strongly  
Agree

☐

19. What is the name of the new heart disease drug described in the press release?

Note: Randomized order of responses

- ☐ DiBil
- ☐ Raston
- ☐ Novar
- ☐ Paxon

20. According to the press release, the new heart disease drug is most effective for which racial group?

Note: Randomized order of responses

- ☐ African Americans
- ☐ Hispanics
- ☐ Asians
- ☐ Caucasians
- ☐ No Racial Group was Mentioned

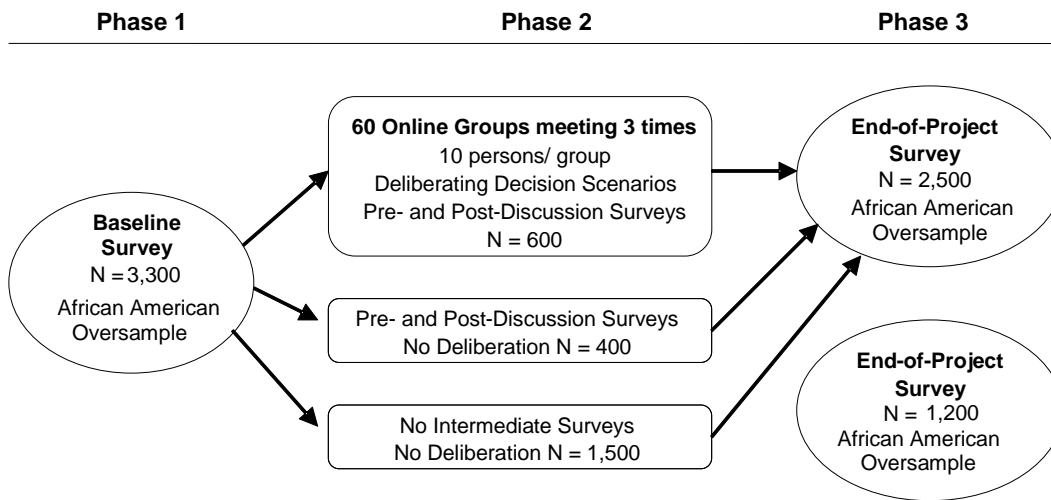


21. According to Dr. Gail Jones, the medical professor quoted at the end of the press release, which of the following are highly significant risk factors for heart disease in the United States?

Note: Randomized order of responses

- ☐ Smoking Cigarettes
- ☐ Diet and Exercise
- ☐ Genetics and Family History
- ☐ All of the Above

# APPENDIX E: PROJECT DESIGN FOR PUBLIC OPINION, DELIBERATION AND DECISION MAKING ABOUT GENETICS RESEARCH (GPOD)



## APPENDIX F: STUDY 2 AND STUDY 3 SAMPLE CHARACTERISTICS

	Study 2 Sample (N = 3,317)	Study 3 Sample (N = 1,363)
<i>Gender</i>		
Male	46%	45%
<i>Age</i>		
18-29	18%	18%
30-44	29	28
45-59	31	33
60+	22	21
<i>Education</i>		
Less than High School	4%	4%
High School	22	22
Some College	33	30
Bachelor's Degree	24	27
Advanced Degree	17	17
<i>Race</i>		
White (non-Hispanic)	77%	78%
<i>Political Ideology</i>		
Conservative	33%	31%
Moderate	20	20
Liberal	47	49
<i>Political Party</i>		
Republican	33%	30%
Independent / Other	18	20
Democrat	49	50
<i>Religion</i>		
Baptist	18%	16%
Protestant	22	22
Catholic	17	17
Other Religion	26	27
No Religion	17	18
<i>Income</i>		
Under \$30,000	14%	15%
Under \$60,000	30	30
Under \$100,000	32	32
Under \$150,000	16	16
\$150,000 plus	8	7

	Study 2 Sample (N = 3,317)	Study 3 Sample (N = 1,392)
<i>Personal Health Status</i>		
Excellent	12%	13%
Very Good / Good	76	75
Fair / Poor	12	12
<i>Knowledge about Genetics</i>		
None / Low	3%	2%
Moderate	26	24
High	71	74
<i>Attention to Health/Science News</i>		
None / Very Little	29%	27%
Some	42	42
A Great Deal	28	31

Note. None of the sample characteristics across the two studies are statistically significantly different at the .05-level.